



COMMERCIAL FISHERIES ABSTRACTS

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES





UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

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SYSTEM," by Maurice E. Stansby, K. L. Osterhaug, and F. Bruce
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MERCIAL FISHERIES ABSTRACTS about once a year.

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commercial products.

0.6 SPECIFIC ANOSMIA: A CLUE TO THE OLFACTORY CODE Amore, J. E. (Western Regional Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Albany, California) Nature 214, No. 5093, 1095-1098 (June 10, 1967) A smell may be composed of several distinct primary odors. For each primary odor, people may have a biological detector that, by reacting specifically to certain odor stimuli, senses certain odor characteristics. The identity of these primary odors, however, has yet to be determined. If just one could be, it might serve as a key to the whole olfactory code. Certain people may have a generally good sense of smell and yet be unable to sense a certain specific odor. For example, about 10 percent of the population cannot smell hydrogen cyanide; about 0.1 percent cannot detect the butyl mercaptan odor of a skunk. This "odor blindness" is known as "specific anosmia"--that is, inability to smell a specific odor. As long ago as 1948, Marcel Guillot hypothesized that each type of specific anosmia might be caused by a defect in the corresponding primary odor detector; therefore, a knowledge of the various types of specific anosmia would be a good start toward a knowledge of the primary odors. On this assumption, the present author investigated isobutyric acid anosmia--the inability to perceive the sweaty odor of isobutyric acid. He concludes that he has identified, for the first time, a primary odor: the sweaty primary. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin	0.7 NUTRITIONAL EFFECTS OF FOOD PROCESSING Bender, A. E. (Nutrition Department, Queen Elizabeth College, London, W.8, England) Journal of Food Technology 1, No. 4, 261-289 (December 1966) The preparation and preservation of foods involve a number of different processes, most of which affect the nutritional value. When losses of nutritional value occur during processing, they will vary with the conditions, and it is not possible to generalize about the effects, even of such a destructive agent as heat. Although heat normally causes some destruction of vitamins and proteins, under certain conditions heat can preserve or even improve nutritive value. This survey of the properties of nutrients is intended as a guide to the behavior of nutrients under a variety of processing conditions. Vitamin B₁ (thiamine) is one of the most labile vitamins and can undergo considerable damage during food processing. Fish lose up to 50 percent of their thiamine when boiled and 75 percent when canned. In general, losses of vitamins in fish are similar to those in meat, although there may be greater losses of vitamin B₁ in fish because of the presence of thiaminase, which destroys the vitamin. Smoking of fish has little effect on the B vitamins. Salting or smoking cod has no effect on the availability of amino acids and thus has been suggested as a method of preserving fish in developing countries where other methods of preservation are not practicable. Freezing of fish may (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
0.6 FOOD TECHNOLOGISTS DEVELOP NOTABLE ADVANCES IN SEAFOOD Anonymous National Fisherman 48, No. 5, 9C (August 1967) Seafood technology has been advancing at a rapid rate as the nations of the world look to the oceans as sources of food. Herman Groninger, research chemist with the Bureau of Commercial Fisheries Technological Laboratory, Seattle, Washington, outlined some of the more significant discoveries in the field of seafood technology during the past few years. The following are highlights of his report. Two chemists in Germany have developed a method for distinguishing between unfrozen meats that have been frozen and thawed, and meats that have never been frozen. The method is based on the fact that two forms of the same enzyme, glutamate-oxalacetate transaminase, are found in two separate and distinct parts of a muscle. In an unfrozen piece of meat, only one of the two enzyme forms can be detected. When a piece of meat has been frozen and thawed, the second enzyme form mixes with the first form, and the two forms can be separated by a simple experiment. Therefore, the drip from a piece of meat that has never been frozen will contain only one enzyme form while the drip from a piece of meat that has been frozen and thawed will contain both forms. The reliability of the test is not affected by the freezing temperature, the length of time the product has been frozen, or by repeated freezing and thawing. A scientist in Great Britain studied the quality of meat that came from pigs given a tranquilizer before they were butchered. The rate of biochemical and (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple	1.0111 GATT NEGOTIATIONS REDUCE TRADE BARRIERS Anonymous Foreign Trade (July 1, 1967) (Department of Trade and Commerce, Canada) Fisheries of Canada 20, No. 2, 15-16 (August 1967) The Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT) was concluded on June 30, 1967, when Canada and other participating countries signed the final text of the negotiations in Geneva, Switzerland. The Agreement will have a significant effect on Canadian trade of fishery products. The United States will be eliminating the duties on \$91.4 million of 1966 Canadian exports of fisheries products, such as fresh, frozen and salted fish from coastal and inland fisheries. Tariff reductions, generally about 50 percent, are to be made on an additional \$40,000 of Canadian products. In terms of either elimination or reduction of duties, some 76 percent of the total Canadian exports of fisheries products to the United States that are currently subject to duty will be affected. No change was made in the tariff quota provisions for groundfish filets. Countries of the European Economic Community will be making reductions of 15 to 33 percent from current rates on virtually all fishery items currently exported by Canada. The most important of these reductions are frozen salmon from 10 to 8 percent (1966 exports were \$5.2 million), canned salmon from 16 to 13 percent (1966 exports, \$4.1 million), salt-water fish filets from 18 to 15 percent (1966 exports, \$549,000), and fresh lobsters from 15 to 10 or 13 percent (1966 exports, \$530,000). (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple

physical change after the pig had been killed was less than that under normal conditions when they were highly excited before being butchered. With present fishing methods, there is little opportunity to tranquilize fish before they are caught; however, with present capture methods used for shellfish, a large amount of control over the physiological state of the shellfish is possible. A possibility is to introduce tranquilizers into the live tanks of king crab vessels and processing plants.

Two Australian scientists reported that the colder a meat product is when it goes through rigor, the better the quality of the meat will be. Two researchers in Japan reported that maintenance of original skin color during the frozen storage of skin-on fillets was dependent upon low temperatures. Considerable discoloration occurred after 35 days of storage at 29° F., whereas only a small amount of pigment loss occurred after 50 and 75 days at 0° and -21° F., respectively.

Economical means for removing edible muscle from fillet bones and small fish was studied by a Soviet scientist. A system used with some success on Caspian sprats involves cooking the whole minced sprats at 140° F. for 1½ to 2 hours with 20 to 30 percent added water. The bones are then removed by straining, and the protein is evaporated to 70 to 75 percent moisture. The resulting product has been added to minced sausage meat at a 20 percent level.

By careful screening, he selected subjects who had a normal sense of smell. Then, using a geometric concentration scale consisting of binary dilution steps, he determined the threshold of his subjects' olfactory sensitivity. Any subject whose sensitivity was at least three binary steps below the normal mean was classified as anosmic. Next he tested the normal subjects and the anosmic subjects for their olfactory thresholds towards 18 purified compounds that are related to isobutyric acid. These compounds were chosen to show the effect of three independent variables (molecular size, molecular shape, and integrity of the functional group) on threshold deficiency.

Results of the tests on molecular effects showed that molecular size plays an important part in governing isobutyric acid anosmia; isovaleric acid has an almost ideal molecular shape for revealing this type of anosmia; and the ability of a compound to exhibit this anosmic principle depends on the integrity of the complete, free, carboxylic acid functional group. The detector was revealed to react specifically to the carboxylic acid functional group; to have a relatively wide tolerance, being fairly selective to straight-chain molecules of a size from C₄ to C₇, but responding to those from C₁ to C₁₀; and, of the compounds tested, to respond to isovaleric acid most exclusively. Isovaleric acid, then, is the primary odorant.

The author points out that his method is a general procedure that is applicable to definition of any primary odor. Following quantitative definition of a given type of specific anosmia and its demarcation from all other types of anosmia, it permits identification of new primary odors. [8 references]

Tariff reductions by Sweden on canned lobsters are from 75 to 40 kronor (\$6.82). Sweden imported \$330,000 worth of Canadian canned lobsters in 1965. Most Canadian export products now enter Denmark without paying duty; however, in the past there has been a duty of 80 øre/kg (about 11¢) on canned salmon and canned lobster. This duty will now be reduced by 50 percent. The values of Danish imports of Canadian canned salmon and canned lobster in 1964 were \$68,000 and \$25,000, respectively. Japan will lower the tariffs on Canadian salted, dried, or smoked salmon roe from 15 percent to 7.5 percent. In 1966, Japan imported \$1,561,000 worth of these products from Canada. Israel will make reductions of from 5 to 3 Israeli pounds per kg. on imported Canadian canned salmon. As part of a recent tariff reform, Brazil will eliminate a number of nontariff barriers arising from consular formalities and prior deposits. Brazil has also bound a number of tariff rates, such as duty-free entry for cod.

To reciprocate for the concessions concerning reductions and removal of duties on Canadian exports of fish, Canada agreed to provide free entry for fresh, frozen, pickled and dried fish, and for shrimp. The duties on most prepared and canned fish, including sardines, anchovies, herring, salmon, oysters, clams, lobsters, and crabs, are to be reduced by 50 percent. The rates on fish oils are reduced from 17½ or 20 percent to 15 percent.

result in a loss of 50-94 percent of the iodide; defrosting and refreezing causes almost 100 percent loss. Salting and hot smoking causes losses of 30 percent, although losses were less after light salting and cold smoking. Irradiation with 0.3 Mrad resulted in a 40 percent loss of the thiamine of fresh fish or smoked cod; all the thiamine was lost with irradiation of 3 Mrad. With the larger irradiating dose of 3 Mrad, 30 percent of the riboflavin of fresh cod was lost and after storage of the irradiated fish, 60 percent was lost. The nicotinic acid was stable.

Losses of nutrients during processing should be viewed in proper perspective. When the population is well nourished, there is obviously no concern that some foods may be of lower nutritive value. The difficulty lies in determining what is meant by well nourished and in determining which populations are living on sub-optimal amounts of nutrients. There is no evidence that an intake of nutrients above the minimum daily requirement benefits the consumer; however, the general approach is to recommend intakes considerably higher than the minimum requirement. Conversely, any diminution in nutrient intake may be regarded as a retrograde step.

There will always be groups of people living on diets restricted in variety so that they tend to rely on a few foods to supply the full complement of nutrients, for example, reliance on canned foods or on dried or frozen foods. In general, improved methods of processing, which are designed to retain flavor, color, and texture, tend to involve less severe treatment and to cause less damage to the nutrients. [134 references]

1.86

TANNER CRAB--AN UNTAPPED PACIFIC RESOURCE

Pereyra, Walter T. (Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Seattle, Washington)
National Fisherman 48, No. 4, 16-A (July 1967)

On the Continental Shelf of the North Pacific Ocean, a large tanner crab resource lies virtually unused by U.S. fishermen. The Japanese and Russians, in contrast, are catching them in quantity--the Japanese, for example, landed over 36 million pounds of them in 1963. Exploratory fishing surveys and the occurrence of large numbers of tanner crabs in king crab pots have revealed that Chionoecetes opilio and C. bairdi are the two species constituting the resource. Yet another species of tanner crab, C. tanneri, has recently been found in deep water off the coasts of Washington and Oregon. These tanner crabs, a deepwater variety, were caught during a survey of the demersal fishes and invertebrates living in waters southwest of the mouth of the Columbia River.

Adult C. tanneri were caught in trawls at depths of from 250 to 850 fathoms, the greatest number being caught in 175- to 400-fathom water. Males were more abundant in the shallower waters and females in the deeper waters. The largest catch of adult crabs was 625 pounds during one 1-hour drag. In the catch were 99 males, averaging 6 in. in body width and about 2.5 lb. each, and 592 females, averaging 4 in. in width and 0.8 lb. each. The largest crabs of both sexes were caught in shallow waters.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

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SPORULATION OF CLOSTRIDIUM PERFRINGENS
IN A MODIFIED MEDIUM AND SELECTED FOODS

Kim, Chung Hee (Research and Technical Division, Wilson and Co., Inc., Chicago, Illinois), Roberta Cheney (School of Household Economics, University of Alberta, Edmonton, Alberta, Canada), and Margy Woodburn (Purdue University, Agriculture Experiment Station, Lafayette, Indiana)
Applied Microbiology 15, No. 4, 871-876 (July 1967)

The spore-forming characteristics of Clostridium perfringens are important for the understanding of food-borne illness caused by ingestion of large numbers of these bacteria. Several microbiologists have reviewed the need for laboratory media that could be used for consistent production of spore crops. Ellner (1956) formulated a medium in which, frequently, greater than 90 percent of the inoculum of C. perfringens sporulated with 24 hr. at 37° C. Angelotti et al. (1962) modified Lund's (1956) sporulated medium and called it SEC broth. It was found that only SEC broth consistently yielded spore crops capable of resisting exposure to 100° C. for prolonged intervals. In the same study, it was found that Ellner's medium was unsatisfactory for heat resistance studies, although it was usually superior to SEC in numbers of spores produced. The present investigation was undertaken to modify Ellner's medium and SEC broth in an effort to obtain consistent numbers of heat-resistant spores of C. perfringens. Sporulation in food items was included in the investigation as a possible comparison. Spores are defined as those cells that reproduce in the plating medium after heat treatment of 80° C. for 15 min.

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ABSTRACTER: M. F. Tripple

THE TANNER CRAB RESOURCE

SPORULATION OF CLOSTRIDIUM PERFRINGENS

2.05
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FORMATION OF AFLATOXINS BY ASPERGILLUS OSTIANUS WERNER

Scott, P. M., W. Van Walbeek, and J. Forgacs (Food and Drug Directorate, Department of National Health and Welfare, Ottawa, Canada; and Good Samaritan Hospital, Suffern, New York 10901)
Applied Microbiology 15, No. 4, 945 (July 1967)

Aflatoxins are a group of four toxic metabolites that are produced by certain strains of a limited number of fungal species, Aspergillus flavus, A. parasiticus, and Penicillium puberulum. The detection of aflatoxin in isolates from several other species of Aspergillus and Penicillium has recently been reported. The authors found that a member of the A. ochraceus group, A. ostianus Werner, also produces aflatoxins. The strain was isolated from a Japanese dried fish product called katsubushi and was identified according to the methods defined by Raper and Fennell (1965).

The fungus was grown at 25° C. in 12 Fernbach flasks, each of which contained 200 ml. of Mycological Broth to which 0.5 percent yeast extract was added. After 7 days of growth, the cultures were extracted with chloroform, and the combined extracts were chromatographed on a silica gel column. The column was initially washed with ether, and then the aflatoxins, as well as red and yellow pigments, were eluted with chloroform containing 3 percent methanol. The presence of aflatoxins B₁ and G₁ in the eluate was determined by thin-layer chromatography on 250-μ layers of Silica Gel G-HR. Six solvent systems were used:

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ABSTRACTER: M. F. Tripple

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DISTRIBUTION OF NEURAMINIDASE
AMONG FOOD-POISONING STRAINS OF CLOSTRIDIUM PERFRINGENS

Moss, C. Wayne, Marcia A. Schekter, and William B. Cherry (Communicable Disease Center, Public Health Service, U.S. Department of Health, Education, and Welfare, Atlanta, Georgia 30333)
Applied Microbiology 15, No. 4, 718-722 (July 1967)

The enzyme neuraminidase (sialidase) has been reported in animal tissues, in myxovirus, and in a variety of bacteria. In a study of the relation of hemagglutinin to neuraminidase in several strains of Clostridium perfringens, it was found that none of the typical English food-poisoning strains of C. perfringens produced neuraminidase. If the enzyme was found to be generally absent among food-poisoning strains, then a test for the presence of neuraminidase would provide a rapid method for distinguishing these strains from typical C. perfringens Type A strains.

The distribution of neuraminidase was surveyed among 76 strains of C. perfringens. Representative strains from the toxigenic Types A, B, C, D, E, and F and from the atypical Type A food-poisoning strains of both American and English (Hobbs types) origin were surveyed. Both the American food-poisoning and nonfood-poisoning cultures consisted of both neuraminidase-positive and -negative strains. American strains that could not be differentiated from the original English cultures contained both neuraminidase-positive and -negative representatives. In contrast, the English strains uniformly failed to produce either an active intracellular or extracellular neuraminidase. No enzyme activity was detected in the

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ABSTRACTER: M. F. Tripple

FORMATION OF AFLATOXINS BY ASPERGILLUS OSTIANUS

DISTRIBUTION OF NEURAMINIDASE CLOSTRIDIUM STRAINS

EFFECT OF NUTRIENTS ON PHYSIOLOGICAL PROPERTIES OF CLOSTRIDIUM BOTULINUM TYPE E

Gullmar, B., and N. Molin (Swedish Inst. Food Preservation Res. (SIK), Göteborg, Sweden)
Chemical Abstracts 68, No. 5, 1979c (January 29, 1968)

Identities of the compounds were confirmed by formation of acid derivatives on a submicrogram scale from the respective aflatoxin that had been obtained by preparative thin-layer chromatography of a small portion of the eluate from the silica gel column. The remainder of the eluate was rechromatographed on a column of neutral Florisil. Interfering pigments were eluted with 2 and 6 percent acetic acid in chloroform; then the aflatoxins were eluted with acetone and separated by repeated thick-layer chromatography on Silica Gel G. The ultraviolet absorption spectra of the isolated aflatoxins B_1 and G_1 were in accordance with values in the literature. Quantitation of the aflatoxins by their ultraviolet spectra agreed with recoveries that had been estimated by thin-layer chromatography. An infrared spectrum of the aflatoxin B_1 was the same as the spectrum for the authentic compound.

GERMINATION OF SPORES OF CLOSTRIDIUM BOTULINUM TYPE E
IN FISH AND SHELLFISH EXTRACTS

Strasdale, G. A., and Joanne M. Kelly (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 24, No. 8, 1833-1835 (August 1967)

chloroform-acetone (9:1), chloroform-methanol (93:7), benzene-ethanol-water (46:35:19, top layer), ethyl acetate saturated with water, benzene-methanol-acetic acid (24:2:1), and toluene-ethyl acetate-formic acid (5:4:1). Each system indicated the presence of fluorescent substances that were identical with internal standards of aflatoxins B₁ and G₁. The amounts of aflatoxins B₁ and G₁ were estimated as 1 mg. each per liter of culture medium.

2.05 BOTULISM

Gordon, Rosalind A., and W. G. Murrell (Division of Food Preservation, CSIRO, Ryde, New South Wales, Australia)
Food Manufacture 42, No. 8, 34-41 (August 1967)

Botulism in terms of its incidence and mortality rate, the nature and scope of the foodstuffs involved, and some of the principal factors governing its epidemiology and control is discussed in this article. The discussion points out that formulating a general rule to prevent botulism in all types of food is impossible. However, if recommended procedures for food hygiene, processing, storage, and handling are observed, control should be easier. [35 references]

Nevertheless, if consumer demand for crab increases sufficiently to make catching the less abundant species profitable, and if they can be caught along with fish that live at the same depth (for example, sablefish), the resource might have commercial promise. The regulations, of course would have to be changed to permit their being taken by trawls. The cyclical habits of the males and the separation of males and females from April through September would make regulation of the fishery simple.

cycle in the spring.

Their excellent eating quality, plus their large size and seasonal distribution in shallow waters, should make these crabs desirable commercially. However, several economic factors militate against immediate commercial utilization of the species. First, most Pacific coast trawlers do not have enough cable (about 700 fathoms per drum) to trawl for these deepwater crabs, large enough winches to be adapted to accommodate additional warp, or the facilities to hold them once they are caught. Second, stocks of C. opilio, C. bairsti, and Paralithodes camtschatica (king crab) are found in more abundance and at shallower depths than are those of C. tanneri.

The female crabs were quite stationary, being caught in greatest abundance in 350- to 375-fathom waters. Males shifted with the season; from April through September they were most abundant at depths of between 275 and 300 fathoms, whereas the females during the same period were found at depths of between 325 and 400 fathoms. Following this period of segregation, the males began to move into deeper waters, their downward movement ending in January, February, and March. After this mating period, the males moved back into shallower waters, ending the cycle in the spring.

A modified sporulation medium for *C. perfringens* was formulated that consisted of 1.5 percent peptone, 3.0 percent Trypticase, 0.4 percent starch, 0.5 percent NaCl, and 0.02 percent MgSO₄. The addition of 0.1 percent sodium thioglycolate and 0.0001 percent thiamine hydrochloride was considered optional. The modified medium produced a larger number of spores than were produced in SEC broth and which produced spores of greater heat resistance than were produced in Ellner's medium when it was also used as the suspending medium. The optimal temperature for sporulation of five strains of *C. perfringens* was 37° C.; spore production at 5°, 22°, and 46° C. was poor in all the media. Sporulation occurred by 6 hr. and was essentially complete after 20 hr. at 37° C. Noyes veal broth without glucose also supported the formation of heat-resistant spores but did so in smaller numbers than the modified medium did. Very low numbers of spores, or none at all, were produced under the same conditions in slurries of peas or tuna. [14 references]

2.1121	"LOZENGE" TRAWL TRIAL RESULTS Anonymous World Fishing 16, No. 5, 51-52 (May 1967)	A new concept of midwater trawl design, called the "Lozenge" trawl, is intended to avoid distortion on the wings. Sea trials were conducted with a 1,188-mesh Lozenge trawl, and close comparisons were made with a 1,200-mesh Engels trawl. The Lozenge trawl was used both in midwater and on the bottom. In theory, the Lozenge trawl should give an almost square profile when towed in midwater. The square profile was actually achieved by using 22-fathom bridles with 48-sq.-ft. Suberkrub doors and 44-fathom bridles with 65-sq.-ft. doors. The square profile compared favorably with the vertical opening of the Engels net; however, the profile was achieved at the expense of spread between the wings. The water resistance of the two trawls was similar. The Lozenge trawl differs from other four-panel trawls of the midwater class in that the selvages between panels do not occur on the corner of the box section but rather are in the center line of the upper, lower, and sides of the box section of the net. This design is intended to overcome distortion at the mouth when the wings are pulled apart by excessive distance between the trawl doors and should bring related benefits of reduced drag. Underwater observation by divers showed that the improvement in distortion occurred only where the wing joined the belly, where normal nets are inclined to bulge slightly because of the change in the run of the meshes. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
2.1128	DEVELOPMENT OF A SUBMERSIBLE PUMPING SYSTEM FOR A HYDRAULIC SURF CLAM DREDGE Standley, Mark L., and Phillip S. Parker (Exploratory Fishing and Gear Research Base, Bureau of Commercial Fisheries, Gloucester, Massachusetts 01930) Commercial Fisheries Review 29, No. 6, 50-55 (June 1967)	Since the introduction of hydraulic clam dredges in the mid-1940's, little change has taken place in the basic method of hydraulic dredging. The size and efficiencies of the hydraulic gear have now reached the point where larger dredges do not appear to be feasible. The usual clam dredge has a 40- to 48-inch blade and is supplied by 200 to 250 feet of 5- or 6-inch inside diameter hose. The largest dredge currently in use has an 84-inch blade, and two pumps and two hoses are needed to supply water to the manifold. Increasing the size of the dredge necessitates greater flow rates to the manifold. The problems of handling the large hoses and the efficiencies lost in transferring water through these hoses led to the conclusion that a submersible pump mounted directly on the dredge would be desirable. The Bureau of Commercial Fisheries tested a dredge carrying an electrically driven, submersible pump that supplied water to the jet manifold. The pump used was a commercial unit. Installation of a submersible pumping system involves more equipment than does the usual vessel-mounted pump and hose arrangement. A generator of sufficient size must be mounted in the vessel, together with the proper starting equipment and (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: E. R. Weissman
2.113	KEEPING FISHROOMS CLEAN Anonymous Commercial Fishing 5, No. 2, 10-11, 17 (October 1966)	Fishing vessel owners have long been aware of the need for cleanliness in the fish room and for clean fish boxes. However, fish boxes and the fish room proper are usually cleaned by hand scrubbing with or without the use of cleansing and biocidal agents. It is only recently that any effort has been made to introduce modern, mechanized methods of cleaning. A new approach to the cleaning problem is offered by companies that provide a comprehensive cleansing service and that use techniques such as high-pressure sprays to apply modern cleansing and sterilizing solutions. The service has become quite popular, and owners report an improvement in fish quality. Tests have shown that the application of amphoteric biocidal agents effectively and progressively lowered the bacterial count on wooden fish boxes. Tests on wood samples from the boxes showed that a bacterial count of 439 on a cleaned, untreated box was reduced to 14.7 after one chemical treatment and to 1.0 after four treatments. These results emphasized the now accepted rule that only regular, repeated treatment will do the job. One company offers a comprehensive service with special products designed for general cleaning, or for cleaning and sterilizing, with the stress on fish storage and handling areas. The service covers the general cleaning of the ship, of fishing gear, and smoking kilns. The company also offers a method of cleaning water (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
2.114	HYDRAPILOT STEERING GEAR (*) Anonymous Norwegian Fishing and Maritime News 14, No. 2, 37 (1967)	A Norwegian firm is manufacturing electric hydraulic steering gear for all types of vessels up to about 20,000 tons deadweight. The steering gear is manufactured on license in the United States, Japan, and Spain; more than half of the output of the Norwegian plant is exported. The gear was initially designed only for fishing vessels and small coastal ships; but it is being made for large ocean-going ships and is now fitted on board ships of 45 nations. The steering gear consists of three main units. (1) The steering column contains a built-in pump and electric rudder indicator. (2) The electric hydraulic pump unit has a fixed displacement oil pump and control valve for hydraulic and electric operation. (3) The hydraulic rotary double-acting motor requires very limited space and is placed directly on the top end of the rudder stock. The motor serves as the rudder carrier and is dimensioned to absorb axial forces of magnitude many times greater than the weight of the rudder. The bearing system of the rudder prevents vibration and reduces wear on the rudder bearings. The three units are connected by hydraulic lines, so there are no chains or other forms of mechanical linkage. This results in low installation costs and (over) *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
	CLEANING FISH ROOMS ELECTRIC HYDRAULIC STEERING GEAR	

2.1128

overload protection devices. The connector cable is most conveniently handled on a powered reel, which can be mounted anywhere aboard ship that will best suit the operation. Disconnect plugs at each end of the power cable enable the dredge to be removed from the vessel, or the cable to be reeled in at the end of the fishing. The pump is mounted on the dredge with brackets and connected directly to the manifold with a short, flexible connection.

The total cost of the submersible pumping system is greater than that of the deck-mounted system currently in use. This added cost, however, is offset by the greater efficiencies and the convenience of handling the comparatively small electric cable. The additional expense is also reduced by using less expensive cable in place of the expensive hoses. The trend in industry is to even larger hoses; hoses up to 8 inches in diameter are used today, and the cost of this hose and the sleeves and clamps for joining sections is a very large part of the expense of outfitting for clam dredging. In contrast, the cost of the electric cable is comparatively small, and this saving increases as deeper depths are fished.

A dredge with the proper submersible pumping unit that delivers the same volume and pressure to the jet manifold as does a vessel-mounted pump fishes just as well as does the latter. The authors conclude that an electrically powered, submersible pumping system appears to compare very favorably with the conventional system for conversions or for new construction of hydraulic clam dredges.

2.1121

In the case of the Lozenge trawl, the meshes in the wings and fore part of the net were distorted or closed, whereas the meshes in the bosom of the net were open. This would not affect the catching power of the trawl but would have an adverse effect on the efficiency at maximum opening. The meshes at the junction of the belly and tapered section were almost square. The Lozenge net did not appear to have any great advantage over the conventional type of net when used as a midwater trawl.

When the Lozenge net was used as a bottom trawl, its performance was less satisfactory than that of a conventional net. The headline height was considerably reduced, without any associated increase in spread. The result was that the size of the mouth area was only half what it was when the net was used as a midwater trawl. The whole of the lower wings were in contact with the bottom so that they and the underbelly were exposed to possible damage. While this tendency could be overcome in a conventional net by shortening the lower bridles to lift the wings slightly, this had no effect on the Lozenge trawl. It was concluded that the Lozenge net was less suitable for combined demersal and pelagic fishing than a normal four-panel trawl was.

2.114

saving of space. The steering gear assures positive rudder control in even the heaviest seas by combining manual and electric operation.

The hydraulic steering gear offers a remarkable degree of maneuverability and has been installed in a number of fishing, whaling, and sealing vessels. The gear can be delivered in sizes for up to 40 tons per meter rudder torque.

[Abstracter: M. F. Tripple]

The most popular type of self-tipping gear in the Australian scallop fleet is the "rocket launcher." The launcher is constructed from 3-inch steel tubing and is cheaper and lighter than a previous model made from steel plate. The automatic gear has improved the performance of boats because the tipper allows the dredge to be quickly emptied, it can be operated by a small crew, and it can be worked safely in rough weather conditions. The rocket launcher has proved to be most effective on larger boats that can now tow bigger dredges in proportion to their length with no increase in size of crew. An illustration is included.

Alderson, J. L. (Victorian Department of Fisheries and Wildlife, Australia)
Australian Fisheries Newsletter 26, No. 9, 17 (September 1967)

VICTORIAN SCALLOP FLEET CONVERTS
TO "ROCKET LAUNCHER" TIPPER

2.114

2.113

tanks by generating a sterilizing fog. For cleaning and sterilizing fish rooms, the company uses a combined detergent and sterilizer that derives its action from chlorine bromide with the released chlorine acting as a deodorant. Application is by high-pressure spray, which removes the slime and dirt with water pressure.

Another company uses a system that is similar in application, but it is based on the consecutive use of high-pressure water spray followed by chemical spray. The chemical basis of this spray is quite different. The spray is an ampholytic biocide with an amino-acid base that, being closely allied to protein, is active in the presence of food contamination. Its odor-killing properties are due to its action against trimethylamine, the putrefaction product causing a bad fish odor. Other advantages claimed for this product are ability to penetrate cracks and crevices and the deposition of a thin film on the surfaces to prolong its effective action and to make cleaning easier.

Cleaning is no long a localized problem confined to fish boxes and fish rooms. Current developments in the industry have enlarged the scope of cleaning to the factory deck and enclosed gutting spaces of large trawlers and to the space on shore used for processing of fish prior to freezing. Extended fishing trips and demand for higher, controlled standards of quality have also drawn attention to the contamination in port fish markets and filleting tables.

2.115
(*) Tired? BACKACHE? HERE'S WHY!
Gronningsaeter, Arne (Royal Norwegian Navy)
World Fishing 16, No. 6, 79 (June 1967)

In a recent study on stabilization, the following observations were made concerning the effect of ship movement on the health of fishermen. The incessant movements of a ship and the different heeling angles when the fisherman is carrying out exacting and heavy work will bring his body out of the ideal position for performing the job. The muscles will adjust themselves to the task more or less efficiently in order to relieve the load on skeletal joints. However, as the time progresses throughout 8, and sometimes 18, hours of normally back-breaking work (as when large fish are being gutted and headed), the muscles tire and the skeleton takes the strain, with consequent damage to the joints. In due course, this strain will cause myalgic pains. A typical effect is the degeneration and deformation of the disks of the spine. Similar degeneration may take place in the joints of feet, legs, and hips.

A fisherman is subject to about 4 million double changes of body position in the horizontal plane during a 10-year period of normal fishing. This figure is based on 200 working days per year and a roll frequency of the ship of 5 seconds. Many of the extra movements in addition to the normal working functions may be made in a position up to 30° from vertical and may be made while lifting or throwing heavy objects that require maximum effort under quiet conditions.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

2.12
(*) AN INEXPENSIVE SELF-CONTAINED UNDERWATER
DATA RECORDING CAMERA

Mitchell, Charles T. (Marine Resources Operations, California Department of Fish and Game)
California Fish and Game 53, No. 3, 203-208 (July 1967)

A data-recording camera with an underwater housing is relatively easy to build and is not expensive. The unit is self contained, automatically operated, and designed for use in water as deep as 50 ft. An underwater data-recording camera must be fairly compact, able to take a large number of single-frame photographs unattended, have an adjustable lens, and load easily and rapidly. A number of commercially available data-recording cameras costing \$1,000 or more have these features. Several 16-millimeter, magazine-load, motion picture cameras, which can be purchased used for \$25 to \$75, also fulfill these needs. The apparatus described here uses a secondhand motion picture camera and can be built for less than \$125.

The 16-mm. camera described is spring-driven and may be set to expose single frames. A single winding permits exposure of from 10 to 15 ft. of film. The camera may be rewound while submerged, permitting exposure of the entire roll of film. There are 40 frames per foot of film, so exposure of 10 ft. at 1 frame per minute will allow slightly more than 6½ hr. of monitoring from a single winding.

(over)

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 7
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ABSTRACTER: E. R. Weissman

SHIP STABILIZATION AND CREW HEALTH
UNDERWATER DATA-RECORDING CAMERA

2.1470
(*) HELICOPTER FISHING PROVES SUCCESSFUL
Anonymous
Commercial Fishing 6, No. 6, 8-9 (June 1967)

A commercial fishing company in New Zealand uses helicopters as its main fishing units and appears to be making a success of the venture. The company uses two helicopters and fishes both gill nets and longlines. The general principle behind fishing is a lifting operation, and the helicopter is an efficient crane. A series of experiments was carried out with longlines and gill nets; from these results, the company gradually built up and expanded into an economic fishing unit. At the present time, the helicopters are fishing for sprats and mullet.

When the helicopter fishes with nets, a conventional type of gill net is used. The net is loaded into a pot on the side of the helicopter. As the helicopter reaches the area to be fished, a weighted end of the net is lowered. If this end of the net is to be placed on land, a lead weight is used; if it is to be off-shore, a buoy is attached. The helicopter then flies sideways and about 1,000 yards of net is paid out. The net is shot about 300 yd. from the shoal of fish and the helicopter flies over the fish to scare them into the net. The helicopter then lowers a dory and the fisherman works along the net from the dory, transferring the fish into a ring net. As each ring net is filled, the fisherman notifies the helicopter by radio telephone and the helicopter hooks the net holding about 450 lb. of fish and takes it ashore. The contents of the ring net are emptied into an insulated 2½-ton ice-filled trailer for transportation to the factory.

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ABSTRACTER: M. F. Tripple

2.1471
Anonymous
World Fishing 16, No. 5, 50-51 (May 1967)

MIDWATER TRAWLING IN GERMANY

The German fishing fleets have a great deal of experience in midwater trawling for herring. This fishery has traditionally been confined to 82-foot vessels operating in pairs as trawlers. The possibility of using larger vessels in paired trawling has been suggested. Due to a lack of success in earlier bottom trawling trials, it was decided to carry out trials with the pelagic (midwater) trawl, towed by two luggers, and using a special four-panel trawl net.

The wings of the net were designed to follow the natural angle of the net and warps. Nylon was used to reduce water resistance. The usual arrangement of two warps per boat was used, with a greater length paid out on the lower warp. The depth of the net was controlled by the length of warp paid out. The headline was fitted with 35 plastic floats, and vertical opening was assured by 46 pounds of ballast on the footrope, 25 lb. at each lower wing and one 440-lb. weight at the junction of each bridle with its warp. Towing speed was normally 2.15 miles per hour, which resulted in a vertical opening of 65 feet and a total water resistance of 5.2 tons.

The correct distance between the paired boats when towing was calculated by (over)

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ABSTRACTER: M. F. Tripple

FISHING WITH HELICOPTERS
MIDWATER TRAWLING IN GERMANY

2.1475 SEINING WITHOUT BRAILING (*) Anonymous World Fishing <u>16</u>, No. 5, 62 (May 1967) A new Spanish vessel will be used in an experiment on taking tuna aboard from a purse seine; the experiment is designed to show if the time and manpower now expended in purse-seining operations can be reduced. The new vessel will purse the net aft; after the net is drawn up, a stern hatch will open and powerful water turbines will draw in water and fish. The fish will be separated by an angled grill, and the water will be returned to the sea just forward of the propeller. The turbine exhaust is expected to keep the net clear of the propeller by exerting a strong water current. After being brought forward by the pumps, the fish will pass over a conveyor lift into six tanks located amidships. The tanks contain refrigerated brine at -18° C. to chill the fish. The chilled tuna are then transported to the refrigerated hold where they will be held at -25° C. The refrigerating system uses four compressors and direct expansion Freon 22. The freezing capacity of the vessel is 100 tons of tuna per day and the capacity of the fishhold is 35,300 cubic feet. The designer of the vessel believes that the system will revolutionize tuna purse seinning and reduce labor by as much as 50 percent. The 206-foot vessel will *Item on back of card. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple	2.5 SUPERCHILLED FISH FILLETS SHIPPED IN TEST PROJECT Gillespie, G. J. Fisheries of Canada <u>20</u>, No. 7, 3-4 (January 1968) A project designed to get ocean-fresh fish to consumers hundreds of miles from the Atlantic Ocean has been undertaken jointly by the Canadian Department of Fisheries and the Canadian fishing industry in cooperation with the Canadian National Railways. The project involves shipping superchilled fish fillets in mechanically refrigerated railway cars, rather than by the conventional method of packing the fish in ice. The two main objectives of the new shipping project were to establish costs at the plant level and to demonstrate to the processing industry that carload lots of top quality fish can be distributed to distant markets with the superchilled method. The first commercial carload shipment of superchilled fish, more than 15,000 pounds of cod and haddock fillets, went from a Lunenburg, Nova Scotia, fish plant by fast freight to Windsor, Ontario, in less than 72 hr. From the railroad, the shipment was transferred to refrigerated trucks for distribution to retail markets. The Detroit area absorbed most of the shipment, but some portions reached retail outlets as far away as Louisville, Kentucky. The fillets were of top quality when they reached their destinations. This commercial shipment was a new chapter in the story of fish processing and handling that may herald an expansion of the Canadian fresh fish market. The (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
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2.6 NEW APPROACH TO SELLING SEAFOOD IS SUGGESTED BY MARKETING EXPERT Rattigan, R. T. (Corporate Design Consultants, 280 Northen Avenue, Boston, Massachusetts) National Fisherman <u>48</u>, No. 4, 14C-15C (July 1967) The problems within the fishing industry--below-cost sales, fishless Fridays, obsolete equipment, exhausted fishing grounds--have received a considerable amount of attention lately. Yet if the consumption of fish were to increase just $\frac{1}{2}$ lb. per capita, the industry would be hard pressed to meet the demand. Moreover, the global anxiety about feeding a doubled world population by the end of the century puts added responsibility on the industry. These problems are more closely associated with the techniques of marketing the product than with the methods of catching and processing the fish. They are not problems of developing expertise but of creating new markets. The development of new markets must begin with the answer to one basic question: What is the fishing industry's business? The answer is: Food. This answer, in turn, poses a further question: What is the difference between fish and seafood? The answer to that final question spells the difference between growth and decline--profit and loss. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin	3.235 FROZEN STORAGE OF WHOLE LOBSTERS (*) Jangaard, P. M. (Fisheries Research Board of Canada, Halifax, Nova Scotia) Fisheries of Canada <u>20</u>, No. 2, 16 (August 1967) It is difficult to preserve whole lobsters for periods ranging from a week to several months without a serious deterioration in quality. Commercial processors usually completely cook the lobsters, extract the meat, and freeze or can the meat with or without adding brine and citric or ascorbic acids. Many consumers, however, would like to be able to freeze or purchase frozen, whole lobsters that can be subsequently cooked and served freshly boiled or broiled. If raw lobsters are frozen whole and later thawed and cooked, the meat adheres to the shell and is quite difficult to remove. The following precooking procedure is suggested to overcome this problem. <u>Precooking.</u>--The lobsters are precooked in a 2 percent salt brine at 195° for 70 sec., quickly cooled to room temperature, and frozen. After freezing, the lobsters are glazed with a fine spray of water, wrapped in freezer paper, and stored at -29° C. The lobsters being prepared for consumption are thawed and boiled for 15 min. in a 3 percent salt brine. The quality of lobsters prepared in this manner is quite good after 6 to 9 months of frozen storage. At higher storage temperatures of -18° C., a storage time of no more than 3 months will give a good product. Temperatures in the freezing compartments of domestic refrigerators are rarely lower than -9° to -12° C.; at these temperatures the quality of frozen lobsters will deteriorate after a few weeks of storage. *Item on back of card. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
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Complete cooking. Fully cooked lobsters are frozen whole, glazed, wrapped in freezer paper, and stored at -29° C. These lobsters will retain good quality for about 3 months. Fully cooked lobsters can be kept for about 3 months at -21° C, but for less than a month at -9° C.

Fish-meat paste is pressed against a board or a plate with a recess in the form of a fish. After the excess paste is removed from the plate, the molded product is frozen and given an edible coating. Despite the large surface area of the molded product, the paste holds together well.

British Patent 1,021,261
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 1353,
p. 249 (May 1966)

3.235
MOULDED FOODSTUFFS AND A METHOD OF PRODUCING
SUCH FOODSTUFFS [FISH PRODUCTS]

Individual fishermen can no longer afford to concern themselves with catching fish alone; they must collectively look to ways of increasing consumption, creating markets, intensifying the buyers' demand for an expanded supply, and, above all, translating the raw material into something the buyer wants and needs. This concern does not have to be expressed in a costly mass educational program. It can take the form of new marketing techniques that assume fish is a food product. Three basic marketing principles will apply to the process: product differentiation, market segmentation, and market creation.

From time immemorial fish has been thought of as a meat substitute. When it is recognized as the different product that it truly is, it will be served with meat. As a first course or an appetizer, it is easy to prepare and relatively inexpensive.

Market segmentation requires a redefinition of potential users. One-half the population requires no food or any of these constitute young families? How many are working mothers and how many are housewives? How many trips do they make to the supermarket every week? How many segments of the population add up to a generation with few preconceived ideas about fish; a group of people who need time-saving meals; a body of opinion which insists on exploring and trying the untried.

The most important marketing techniques are an inability to create whole new areas of seafood consumption and educational and promotional campaigns which, of course, but other expensive sales methods are relatively inexpensive methods of stimulating purchasing at the point of purchase.

MOLDED FISH PASTE PRODUCTS

commercial shipment was a sequel to a test superchilled shipment of 1,000 lbs. of fillets and 500 lbs. of scallops made a year ago from Vancouver to Lunenburg. The test satisfied the participants that fresh fish can be moved coast-to-coast and reach the consumer as a quality product.

The October venture began at the Lunenburg plant where polyethylene trays, each containing 6 lbs. of fillets, were placed in racks. The fillets were chilled in a refrigerated high-velocity air stream to just above the freezing point. The rate of chilling was measured to ensure that the fillets were removed from the trays when the temperature of the flesh reached 29° F. The superchilled fillets were packed in specially constructed boxes and moved into a refrigerated railway car with a thermostatically controlled temperature of 29° F. For comparison purposes, some of the superchilled fish were iced and about 006 lbs. of nonsuperchilled fresh fish were iced in regular containers and shipped in the same car.

The fish distributors and retailers are prepared to dispose of the fish because the superchilling process gives the product added shelf life. The consumer is assured that the fish will be in good condition when purchased. The process simplifies matters for the railway by eliminating problems created by melting ice and the need to renew the ice enroute. The superchilled fish can be used for ice boxes.

carry five engines; the main propulsion is by twin 1,000 hp. engines, with three compressors. Other features of the vessel are air conditioning, remote control of operations, a fresh-water generator, and four auxiliary launches to be used in the search for tuna. The owners of the vessel feel that search from the surface with echo sounders is better than spotting by planes.

(Abstract of this article appears under 2.12 page 7 - November 1966)

Maeda, Hiroshi
Bulletin of the Japanese Society of Scientific Fisheries 31, 1019-1025 (December 1965)

DISTRIBUTION PATTERN OF GROUND FISH
HOOKED ALONG A ROW OF SETLINE IN THE SHALLOW PART
OF THE CONTINENTAL SLOPE IN THE BERING SEA.
IV - DISTRIBUTION ON A VERY EASY SLOPE

3.12

THE EFFECT OF PHOSPHATE SOLUTIONS
ON THE DENATURATION OF FROZEN COD MUSCLE

Love, R. M. (Torry Research Station, Aberdeen, Scotland), and G. Abel (Chester Beatty Research Institute, Royal Cancer Hospital, Fulham Road, London, S.W.3, England)
Journal of Food Technology 1, No. 4, 323-333 (December 1966)

After frozen fish muscle stored at a given temperature is thawed, the main structural proteins become increasingly insoluble in dilute salt solution; the degree of insolubility is related to length of storage. The development of insolubility, or reduced extractability, proceeds in a manner similar to the development of toughness when the fish is cooked. The criteria of insolubility and toughness are generally considered to be two aspects of the same phenomenon, called denaturation. Fluid exudation is a third criterion.

If it is assumed that a polyphosphate dip really does inhibit fluid loss, as has been reported, then it is surprising that, although one laboratory reports an increased extractability of protein, two other laboratories state that there is no effect on the extractability and two claim that polyphosphate actually decreases extractability and causes deterioration. The behavior of the muscle as studied by fluid exudation and by protein extractability is evidently not the same, so perhaps more than one phenomenon is involved in deterioration during cold storage. Therefore, in view of the contradictory state of the published accounts, the authors investigated the mechanism of phosphate activity.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

3.15
(*)

RADIATION OF FOOD

Roe, Robert S. (Bureau of Science, Food and Drug Administration)
FDA Papers 1, No. 4, 24-29 (May 1967) (Superintendent of Documents, Government Printing Office, Washington, D.C. 20402)

The Food and Drug Administration (FDA) is responsible, under the Food Additives Amendment, for assuring the public that irradiation introduces no known health hazard into food preserved by the method. The term "food additive," as used in the amendment, means any substance that may become a component, either directly or indirectly, of a food or affect the characteristics of a food if it is added to the food. The amendment specifically includes substances intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food, and includes any source of radiation intended for any of these uses. This last section of the amendment is the one in which the FDA has an interest and a responsibility regarding irradiation.

The data that must be submitted in support of a petition proposing a regulation of a food additive must include full information concerning the identity of the additive, the conditions of its proposed use, all relevant information bearing on the additive's physical or other effects, and the quantity of the additive required to produce such an effect. Also required are full reports of investigations made into the safety of the additive if it is used and full information about the methods and controls used during the investigations. Establishing the additive's safety necessitates an evaluation of the possible toxicity of the

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

3.239

THE EFFECT OF INITIAL FREEZING TEMPERATURE
ON THE BEHAVIOUR OF COD MUSCLE PROTEINS
DURING SUBSEQUENT STORAGE: A HISTOLOGICAL STUDY
OF HOMOGENATES

Love, R. Malcolm (Torry Research Station, Aberdeen, Scotland)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 8, 746-752 (August 1967)

The cell fragility method proposed by Love et al. in 1962 is probably the most satisfactory way of measuring the deterioration that frozen fish muscle undergoes during storage. With the method, the fish muscle is homogenized under carefully regulated conditions, and the homogenate is examined either with a colorimeter or under the microscope.

Since the measurement of optical density can be misleading, the author examined the homogenates by photomicrography. Using the cell fragility method, he prepared homogenates from cod (*Gadus morhua* L.) caught by trawl net near Aberdeen, Scotland. He froze two pairs of the homogenates, each pair containing a sample and a control. The first sample was wrapped in aluminum foil, frozen in an air-blast freezer at -30° C., cooled further by immersion in liquid air (at -192° C.) for 30 min., and then warmed up to the initial -30° freezing temperature. Its control was frozen at -30° and left there. The second sample was vacuum sealed in polyethylene bags, superchilled in sodium chloride solution (at -3°) for 4-6 hr., and then stored at -1.6°. Its control was air-blast frozen at -30° and then stored at -1.6°.

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ABSTRACTER: M. F. Tripple

3.2490

A CRITICAL LOOK AT TWO OBJECTIVE TESTS
FOR COLD STORAGE DETERIORATION

Olley, J., E. Stephen, J. Farmer, and I. Robertson (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 2, No. 3, 207-216 (September 1967)

The protein solubility and cell fragility tests have been considered two of the most objective tests for determination of textural changes during the cold storage of fish. During the course of a lengthy study on the effect of lipid breakdown in cold-stored fish, the authors noted several phenomena, which are reported in this paper. It is the contention of the authors that interpretation of the "numbers" obtained by protein solubility and cell fragility tests should not be attempted without a basic understanding of the kind of phenomena that may be occurring.

The protein solubility test and the cell fragility test were applied to a wide range of fish species, and the results are discussed. The discrepancies between the two methods and the artifacts in measurement caused by proteolysis at higher temperatures and possibly by free fatty acid are considered. The effects of pH, horizontal and vertical strength of the myofibrils, and initial protein solubility on taste-panel assessments are included in the discussion.

(over)

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

3.2490

The authors conclude that protein solubility of fish muscle in various species of fish may be related to the free fatty acid and neutral lipid content of the flesh. The lipids may produce some artifacts at the homogenization stage of the determination. Protein solubility can decrease in elasmobranchs during cold storage with production of free fatty acid. In other species of fish, considerable quantities of protein may be initially insoluble in salt solution after freezing and thawing and before free fatty acid production begins. Because protein solubility determinations may be the result of several factors, they are unlikely to correlate well with organoleptic scores, particularly since firmness after cooking is also related to the pH of the flesh.

A high cell fragility reading of E_{520m} may represent a tough fish of low pH or a freshly stored fish of higher pH that is highly acceptable to the palate and is not denatured by cold storage. Because of the influence of pH, the authors suggest that the tester always perform pH measurements. The authors are quite interested in the phase contrast microscopy of the cell fragility homogenate and express the belief that it may explain the nature of the toughening phenomenon.

The final conclusion of the authors is that the protein solubility test and cell fragility test do not measure the same changes and both tests may be influenced by artifacts resulting from proteolysis in fish stored at high temperatures. Neither test should be considered the ideal test for the fish processor or manager in charge of quality control.

3.239

Taste tests of the first sample and its control revealed that the sample was the tougher, as judged by 79 percent of the panel. Microscopic examination showed that many of the myofibrils of the sample were joined together along their sides, whereas those of the control were mostly separated.

A taste panel pronounced Sample 2 less tough to eat than its control, showing that deterioration was much slower in the superchilled fish. Microscopic examination revealed that the myofibrils in the control were long and aggregated; those in the sample were separate and short. After 1 wk. of storage, a considerable amount of myofibrillar protein in the sample seemed to have dissolved away; after 4 wk., it was even more depleted, but no side-to-side aggregation ever showed. The myofibrils in the control, on the other hand, became aggregated into bigger and bigger bundles as storage time passed. The few myofibrils that had not aggregated were short and blurred, just like the ones from the sample.

From these results, the author concludes that the protein holds tissue water with a wide range of bond energies. Freezing to lower and lower temperatures progressively removes more water, till eventually the protein molecule will become damaged. Thawing does not reverse the process. Superchilling, in contrast, removes very little water. The resulting lower concentration of tissue salts creates a solvent action that causes the muscle to partially dissolve in its own salt solution. When dissolved, the structural proteins lose their orientation; therefore they cannot contribute to a tough or fibrous muscle texture. [11 references]

3.15

additive itself or of the toxicity that it may produce in the food. This appraisal usually calls for various feeding tests on laboratory animals. It may also require other types of scientific investigations, such as metabolism studies and chemical tests.

Use of ionizing radiation for food preservation raises the question of just what investigations are essential for a sound appraisal of the safety of various proposed applications of radiation to food products. Data are needed to show the following: (1) whether exposure to ionizing radiation causes induced radioactivity in treated food, (2) whether ionizing radiation treatment produces toxic substances in food exposed to radiation, (3) whether proposed treatments adversely affect the nutritive value of the exposed food, (4) whether the proposed treatments affect their intended purpose, and (5) what doses are necessary to accomplish the purpose. To get these data, FDA scientists have suggested 2-year (chronic) feeding experiments with rats and dogs; this test procedure is essentially the same as that for other food additives. A third species of animal, either mice or chickens, may also be used to provide supporting data. These tests need to be evaluated from the standpoint of general toxicity, pathogenicity, carcinogenicity, and effects on reproduction. Other tests, such as those showing the effects of radiation on microbiological flora or those showing whether radiation is induced, are often necessary.

Proceedings of the Gulf and Caribbean Fisheries Institute, Eighteenth Annual Session, pp. 56-63 (November 1965)

3.15 THE ATOM PRESERVES FOOD
Steinberg, Maynard A. (U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Gloucester, Massachusetts)

The effects of three phosphates on denaturation during cold storage were measured by the cell fragility technique. Very low figures, usually indicative of a great deal of denaturation, resulted even before 30 days of cold storage had begun. The values from sodium hexametaphosphate were slightly lower than those from other phosphates, and the difference was not a pH effect. The initial values of samples treated with polyphosphate were so low that no further decrease occurred during storage. The values obtained with polyphosphate alone were slightly lower than the values with polyphosphate and chloride.

Protein extractability of fish treated with polyphosphate and stored 15 and 26 days at -9° C. was measured. It was clear that the effect of polyphosphate on protein extractability was indefinite and slight and could not be compared with the overwhelming effect on cell fragility values.

The solvent action of the polyphosphate solutions was investigated quantitatively. Polyphosphate exerted a strong solvent action on muscle proteins, though not as great as that of 5 percent NaCl. The solvent action of the polyphosphate-NaCl mixture was slightly greater than that of polyphosphate alone.

Electron microscopy showed that low cell fragility values were the result of the solvent action of the phosphate solutions, which removed some of the protein from the myofibrils and reduced the density of the cell fragility homogenate. Some of the dissolved protein was deposited on the surface of the fillets. The resulting film probably seals the fluids in the fillet and reduces drip.

It was the conclusion of the authors that certain improvements may result from the use of polyphosphate. However, polyphosphate is clearly no substitute for good freezing and cold-storage practices, and it will be of no benefit if the fish is denatured. [32 references]

3.2490 FROZEN STORAGE CAPABILITIES OF CHANNEL CATFISH Greig, R. A. (Bureau of Commercial Fisheries, Ann Arbor, Michigan), and J. R. Donahue (Bureau of Commercial Fisheries, St. Louis, Missouri) American Fishes and U.S. Trout News <u>12</u>, No. 3, 12-13 (September-October 1967) At the present time, a large percentage of farmed channel catfish are being sold fresh in live markets; however, the live markets cannot support all the increased production. A good share of the catfish production from both natural and pond-reared sources will have to be frozen. Although there has been substantial increase in the use of frozen channel catfish during the past few years, several economic and marketing problems are encountered when establishing a facility for processing and distributing a frozen catfish product. Most of these problems can be solved if the frozen product retains good quality for a substantial period of storage. Good storage life is important to allow wide distribution and to convince buyers that the frozen product is as acceptable to consumers as is the fresh product. Unfortunately, there is little information available on the shelf life of frozen catfish. The authors decided to investigate the frozen storage characteristics of a catfish product. Pond-reared channel catfish were dressed, and 5 pounds of catfish was placed in unsealed plastic bags, which were packed in waxed cartons and frozen and stored at about -5° F. A bag of catfish was periodically thawed, and the catfish were cooked before being presented to a taste panel. The thawed raw product was (over) COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO 3 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple	3.2495 THE REACTION OF MYOSIN WITH MALONALDEHYDE Buttkus, H. (Fisheries Research Board of Canada, Vancouver 8, British Columbia) Journal of Food Science <u>32</u>, No. 4, 432-434 (July-August 1967) When unsaturated fatty acids are oxidized, interaction of the products of oxidation and the cell constituents can lead to destruction of the properties of such constituents as proteins and vitamins (Lea, 1962). Inactivation of mitochondrial enzymes increases as oxidation increases (Bernheim et al., 1952). Not only is malonaldehyde, which is a product of autoxidized polyunsaturated fatty acids (Sinnhuber et al., 1958), the major constituent in water extracts of oxidized methyl arachidonate and methyl linolenate, it interacts with protein (Kwon and Olcott, 1966). In the work reported here, the specific interactions between malonaldehyde and trout myosin were investigated. Trout myosin is a structural and contractile protein that constitutes from 50 to 60 percent of the proteins in the fish's muscle. It contains 460 lysine residues per molecule, being identical to rabbit myosin in this respect. Its molecular weight is about 5×10^5. Trout myosin at a pH of 6.8 and an ionic strength of 0.5 was reacted with different concentrations of malonaldehyde at temperatures ranging from -20° to +100° C. The concentrations of ϵ-amino groups to malonaldehyde were in the ratio of 1:5.5. At room temperature, from 50 to 60 percent of the ϵ-amino groups were (over) COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO 3 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin
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3.4 STUDIES ON SMOKED FISH PRODUCTS (*) I - MANUFACTURE OF SMOKED HERRING (1) Akiba, Minoru, Terushige Motohiro, and Shunichi Kudo Bulletin of the Faculty of Fisheries Hokkaido University <u>17</u>, No. 2, 117-122 (August 1966) Changes in the water and salt content of herring meat during the salting or desalting process were studied. The changes were compared with those in the hardness of the herring. During processing, the hardness of herring meat was inversely proportional to the content of salt. II - The effect of pressure by weights on the penetration of sodium chloride into fish muscle during salting.--pp. 152-156 (November 1966). The penetration curves of sodium chloride into fish muscle placed under pressure by weights were estimated. When the pressure increased, sodium chloride penetrated more rapidly. III - Manufacture of smoked herring (2).--pp. 157-161 (November 1966). The chemical changes in herring meat during cold smoking were studied. Decomposition of desalted herring meat was noticeable when the fish was severely desalted before being smoked. IV - Manufacture of smoked herring (3).--pp. 229-233 (March 1967). Chemical changes that occur in herring muscle during smoking under varying degrees of *Item on back of card. (over) COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO 3 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. M. Gwin	3.5 PREPARATION OF LIGHT-SALTED FISH BY BRINING Legendre, R. (Fisheries Research Board of Canada Technological Station, Grande-Rivière, Quebec) Journal of the Fisheries Research Board of Canada <u>24</u>, No. 8, 1693-1699 (August 1967) A wide variety of procedures, of which kench salting is the oldest and simplest, have been developed for the preparation of salted cod. With the kench-salting method, layers of split fish are alternated with layers of salt. The fish are stacked with the fleshy side up; the top layer of fish is placed skin up. More salt is applied to thick fish and to the thicker parts of normal-sized fish than to thin fish and thinner parts. The resulting pickle formed from the water extract is allowed to drain off. This method gives satisfactory results for heavy-salted cod, but the products contain an adhering salt layer that must be removed. The product often lacks uniformity, and bacterial contamination occurs with light-salted fish. This method is usually used only when space is limited. Pickle salting is another method of preparing salted fish. Dry salt is applied to the fish as in kench salting, but the fish are put in tanks and the pickle is not allowed to drain off. The salt is distributed by hand only in the area where the backbone has been removed; napes and tails are salted from the formed brine. A uniform product is obtained and a separate wash is not required. However, the individual treatment of the fish requires much labor and limits the (over) COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO 3 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
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modified by the malonaldehyde interaction. As the temperature of incubation was decreased toward 0°, the reaction rate was decreased. However, when the temperature of the reaction mixture was lowered below 0°, the reaction rate increased, becoming almost as great at -20° as it was at +20°. Quadrupling the proportion of myosin in the reaction mixture did not alter the pattern of the reaction rate--again the reaction rate of the frozen solution almost equaled that of a solution at room temperature. This acceleration in rate has been attributed to a concentration of the molecules during freezing and to a catalytic effect involving the structure of the ice (Grant et al., 1966, and Klovsky and Pincock, 1966).

Amino-acid analysis conducted before and after reaction at 100° for 1 min. showed that all lysine residues were recovered and that any product that had been formed during the reaction was separated again into its original constituents during hydrolysis. It also showed that malonaldehyde reacts with histidine, tyrosine, arginine, and methionine in the following percentages, respectively: 100.0, 36.8, 21.9, and 20.0.

When the reaction mixture was frozen to -20° and stored for 6 days, malonaldehyde reacted with methionine, lysine, tyrosine, and arginine in the following percentages, respectively: 32.0, 27.6, 26.3, and 9.7. Since histidine did not react, the author concludes that histidine residues are located in protected regions of the myosin molecule, which remains folded in the frozen state, making the histidine inaccessible to reagents. Another observation he made was that some of the lysine residues formed a stable product that did not break down during acid hydrolysis. [15 references]

examined visually, and a two-thiobarbituric acid test was used to objectively follow any development of rancidity.

Results of evaluation by the taste panel indicated that the frozen catfish were acceptable after 16 months of storage. Most of the panelists reported that the catfish had not lost their initial flavor and good quality. That the catfish flesh was soft was considered typical for the species; softness was not caused by the frozen storage. Although the catfish became dehydrated during storage, the appearance of the flesh was not unduly affected until after about 10 months of storage. After 10 months, the cut surfaces of the flesh were whitish and had a fibrous appearance.

The thiobarbituric acid values from the frozen catfish did not increase significantly during storage. The catfish were apparently not susceptible to rancidity under the storage conditions. The chemical findings supported the organoleptic results.

The authors concluded that properly packaged catfish can be marketed as a frozen product without appreciable loss of quality during a lengthy period of frozen storage. Frozen catfish held 16 months at -5° F. were quite acceptable after being cooked. Lengthy storage life may not be achieved with usual commercial storage and handling practices. However, a shelf life of 10-12 months could be expected during commercial storage if the temperature of the product did not exceed 0° F. and if a proper packaging material were used. The findings should interest persons contemplating heavy production of pond-reared catfish, because a frozen product may be the best outlet should the live markets become saturated. A frozen product allows wide geographical and seasonal distribution.

possibility of mechanization. The pickle-salting method is used in the preparation of Gaspé-cure fish. The Gaspé-cure fish requires only 8-10 kg. of salt per 100 kg. of fresh split fish. At the end of curing, the salt content is 4-6 percent, which is favorable for the formation of slime-forming bacteria.

A recent development, called brine salting, reduces handling of fish during pickle salting by directly immersing the fish in a solution of salt and water. In view of the potential advantages of brine salting and because this method lends itself to mechanization, a series of experiments was conducted to determine the possible advantages of this method for the preparation of light-salted cod of the Gaspé-cure type.

Batch salting operations were conducted, using an equal weight of fish and brine. Good results were obtained using 25 percent by weight salt solution and 5 hours of salting. Optimum conditions for salting were continuous circulation of brine, constant strength of the brine, a temperature of 18° C., and 18-percent brine solution, and an 8-hr. exposure period. A curing period of 12 hr. was necessary when the brine temperature was 10° C. and the brine concentration was 22 percent. In each case, the salted product had to be placed on the floor for a few hours to permit removal of excess water from the surface of the product.

The water content of the fish prepared by brining was higher than that of the conventionally prepared fish; however, the drying rate was also higher, which resulted in an overall drying time that was nearly the same. With efficient drying it was possible to obtain a product from brine salting that resembled the regular Gaspé-cure fish in both appearance and chemical characteristics.

humidity from below 80 percent to above 90 percent were investigated. When the relative humidity of the smoking chamber was below 90 percent, the decomposition of the muscle during smoking was not significant; however, when the humidity was above 90 percent, decomposition was quite noticeable.

V - Change in the amount of bound water in fish muscle during smoking.--pp. 234-240 (March 1967). The change in the amount of bound water in Atka mackerel flesh during smoking was determined. The following results were obtained: (1) the absolute amount of bound water decreased during salting before smoking; (2) the amount of bound water also decreased with the reabsorbing of water in the desalting stage; and (3) the amount of bound water decreased continuously during the smoking process, which may have been caused by a decrease in the holding-water capacity of the fish muscle protein because of decomposition of muscle tissue. [12 references]

List, G. R., R. L. Hoffmann, Helen A. Moser, and C. D. Evans (Northern Regional Research Laboratory, Peoria, Illinois)
Journal of the American Oil Chemists' Society 44, No. 8, 485-487 (August 1967)

During the most careful distillation of unsaturated methyl esters, when all possible precautions are taken to avoid contact with air, products are still obtained that retain enough odor to render them useless for odor-precursor studies. The oxidative stability of unsaturated esters can be improved by using a sequential purification technique that includes crystallization from urea and high-vacuum distillation. Because fatty esters fulfill the structural requirements, they can be used as psychometric standards after the urea crystallization. A single urea crystallization is satisfactory for removing odor constituents from fatty methyl esters except from the most highly oxidized samples. The urea crystallization method gives high yields of pure esters, and the fatty ester composition of the esters is unaltered from the original material. These pure esters are suitable substrates for basic odor studies. The initial concentration of odorous compounds is too small to be measured directly by gas chromatographic means. This sensory work may therefore be the first to show that volatile oxidative cleavage products are easily removed from fatty esters by urea treatment.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

Neudoerffer, T. S., and C. H. Lea (Agricultural Research Council, Food Research Institute, Low Temperature Research Station, Cambridge, England)
British Journal of Nutrition 21, No. 3, 691-714 (1967)

In a previous paper, the authors measured the effects of a diet containing 2.5 or 5.0 percent fish oil on the nutrition of turkeys, and on the fatty acid compositions and stabilities of the skin fats. The measurements were made by comparing the test birds with control birds receiving a diet containing 2.5 percent beef fat. The authors found that the characteristic highly unsaturated fatty acids of the fish oil were deposited in the turkey depot fat roughly in proportion to their concentrations in the dietary lipid; an exception was acid 22:5, which reached two to three times the expected level. In the present paper, this work was extended by analysis of skin fats of two additional groups of turkeys receiving the basal diet without added fat or a basal diet plus 2.5 percent beef fat, and by analysis of fractionated lipids of the breast and leg muscles of all five groups of birds tested.

Each group of turkeys was fed one of the following diets: basal Diet A--basal diet plus 2.5 percent beef fat; Diet B--basal diet plus 2.5 percent anchovy oil; Diet C--the same as Diet B plus 0.02 percent ethoxyquin; Diet D--basal diet plus 5 percent anchovy oil; and Diet E--basal diet plus 2.3 percent cereal lipid.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

Woods, W. D., E. L. McCune, and B. L. O'Dell (Department of Agricultural Chemistry, and Veterinary Microbiology, University of Missouri, Columbia)
Proceedings of the Society for Experimental Biology and Medicine 125, No. 1, 124-127 (May 1967)

During experiments involving the use of high-fat diets to produce vitamin B12 deficiency in chicks, a potentially lethal dermatitis was seen. When the chicks were fed otherwise adequate diets containing about 20 percent of a vegetable oil, they suffered a high rate of mortality within a period of about 2 weeks. The feathers became saturated with oil, and preliminary experiments showed that the dermal lesions and eventual death resulted from external contact with the fat and not from consumption of the diet. Similar observations had been previously reported, but the mechanism by which topical fat causes death had not been described. This investigation was undertaken to provide information on the etiology of this syndrome. The results show that the degenerative changes in the skin induced by a lipid allows the infiltration of microorganisms and that infection probably is the actual cause of death.

White Leghorn chicks were used in the investigation because preliminary observations had shown them to be more susceptible to topical fat than broiler breeds were. However, the chicks became less susceptible with age; mortality was directly related to the proportion of the body covered with fat. All the vegetable oils tested, including soybean oil, corn oil, olive oil, and hydrogenated cottonseed oil, caused death.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

Ito, Keiji (Faculty of Fisheries and Animal Husbandry, Hiroshima University, Fukuyama, Hiroshima, Japan) and Keisuke Miyazawa and Yoshiro Hashimoto (Laboratory of Marine Biochemistry, Faculty of Agriculture, The University of Tokyo, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 6, 572-577 (June 1967) (In English)

Although γ -guanidinobutyric acid is widely distributed throughout the plant kingdom, evidence of its presence in marine algae has been largely limited to findings in green alga (Mourgue and Dokhan, 1954). Most of these findings, however, have been based on data derived from paper chromatography.

In an earlier paper (1966), the authors of the present work reported that they had found gigartinine alone or in company with arginine in *Gilidium amansii*, *Grateloupia livida*, *Polyopes polydeoides*, *Carpopeltis flabellata*, *Hypnea japonica*, *Glacilaria textorii*, and *Gymnogongrus flabelliformis*. They also reported that the red alga *G. flabelliformis* contains quantities of gongrine and gigartinine. They did not, however, make estimates of the quantity. After preliminary tests revealed that gongrine and gigartinine constitute a large part of the extractive nitrogen and show a marked seasonal variation, they undertook to determine the size of the quantity and the degree of the variation.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

Infrared spectra, absorption spectra, and elution diagrams of specimens collected in November and December 1965 and January 1966 were used to isolate and identify the guanidino and guanylureido compounds. The concentration of γ -guanidinobutyric acid was low in all specimens; free arginine was not revealed by ion-exchange chromatography, but its presence was clearly demonstrated by paper chromatography after the gartanine had been isolated. The percentage of total nitrogen and the concentration of gongrine and gartanine (figured as a percentage of the extractive nitrogen) was, respectively, in November, 3.58, 11.5, and 22.4; in December, 4.05, 12.9, and 35.4; in January, 3.65, 34.2, and 8.9. In summary, gongrine and gartanine constitute from one-third to almost one-half of the total extractive nitrogen and vary markedly with the season.

Bendz, Gerd, Johan Santesson, and Lelf Tibell (Univ. Uppsala, Sweden)
Chemical Abstracts 65, 14079a (October 24, 1966)

LICHENS. II - THIN-LAYER CHROMATOGRAPHY
OF ALIPHATIC LICHEN ACIDS

6.32

oil, old chicks, the skin became hyperemic the second or third day, and by the fourth day there was severe skin damage characterized by blisters, erythema, edema, and a serous exudate. Within 5 days after application, death occurred in about 70 percent of the birds. The skin on the surviving birds developed a crusty dermatitis by the seventh day and the chicks became dehydrated in appearance. Under microscopic examination the skin showed ulceration, thickening of the keratin layer, epithelial degeneration and the presence of bacterial colonies and fungi in the epithelial debris.

The presence of microorganisms in and on the skin suggested that infection was contributing to both the skin lesions and the mortality. Antibiotics were incorporated into the oils before application to determine the effect of oil when the microbial population was depressed. Application of corn oil at 48-hour intervals produced severe skin lesions and high mortality. More frequent applications were less harmful because a twice daily treatment with oil inhibited microbial growth, as did the antibiotics. The mitigating effect of antibiotics on skin lesions supported the concept that microbial infection played a major role in both dermatitis and mortality.

(Abstract of this article appears under 9.14 page 19 - September 1966)

Hashimoto, Yoshio, Tomotoshi Okachi, Takeshi Watanabe, Atsushi Furukawa, and Takeshi Umezu
Bulletin of the Japanese Society of Scientific Fisheries 32, 64-69 (January 1966)

MUSCLE DYSTROPHY OF CARP DUE TO OXIDIZED OIL
AND THE PREVENTIVE EFFECT OF VITAMIN E

4.92

The lipids from breast and leg muscles of all five groups of turkeys were fractionated by thin-layer chromatography into five neutral and six phospholipid fractions; the fatty composition of each fraction was determined by gas-liquid chromatography.

The individual lipid fractions varied widely in fatty acid composition and in the degree to which they were influenced by the dietary fat supplements. Small but consistent differences were seen between corresponding fractions from breast and leg muscles. Sphingomyelin (SP) and lysophosphatidylcholine contained 76 to 80 percent saturated acids; the other phospholipids were 44 to 48 percent saturated, and the neutral lipids were 38 to 50 percent saturated. Phosphatidylserine, phosphatidylinositol (PI) and, to a lesser degree, phosphatidylethanolamine (PE) were rich in stearic acid, although palmitic acid was more abundant in the diets and in the other muscle lipids. SP contained 1 to 2 percent unsaturated linoleic acid. PE and PI were richest in arachidonic acid and other polyene acids.

The polyunsaturated fatty acids of the fish oil extensively displaced oleic and linoleic acids from all fractions except the SP fraction; arachidonic acid was displaced from PE but not from PI. The degree to which the fish oil polyunsaturated acids of the three series entered the muscle lipids varied with the acid and with the fraction. Docosahexaenoic acid (22:6) reached a concentration in PE of 20 to 25 percent, which was nearly five times the concentration in the dietary lipid. [24] references]

Freshly distilled methyl linoleate, cottonseed, and soybean methyl esters produced a variety of different odor responses and were unsuitable for sensory evaluation. Sensory results indicated that untreated esters were not bland and so were unsuitable for odor precursor studies. Odor evaluation of urea-purified soybean methyl esters, which were presented to the panel in a triangle test in which two of the samples were identical and untreated, showed that rancid, grassy responses were greatly reduced after urea treatment. When two untreated samples were presented along with one urea-purified sample, the majority of the panel members had no difficulty in selecting the identical pair. These studies indicated that a highly oxidized sample of methyl linoleate may require two successive urea crystallizations before a suitable odor base is achieved. Rancid, painty, and fishy odors were successfully removed by the urea treatment.

The panel was unable to distinguish between any combination of urea-purified samples of methyl linoleate, cottonseed, or soybean methyl esters. However, in all triangle tests, they identified any untreated sample that was presented along with treated samples.

Soybean methyl esters were deliberately autoxidized with and without copper catalyst to test the method for removal of odor constituents. Panel members were unable to identify the correct pair when a sample autoxidized with presented to the panel in a triangle test along with a sample autoxidized without catalyst. This experiment further pointed out the need for a method to remove odors from methyl esters. [24] references]

6.4	MICRO-EMULSION PROCESS FOR THE PREPARATION OF SUCROSE ESTERS Osipow, Lloyd I., and William Rosenblatt (Foster D. Snell Inc., Subsidiary of Booz-Allen Applied Research Inc., New York, N. Y.) Journal of the American Oil Chemists' Society <u>44</u>, No. 5, 307-309 (May 1967) A practical commercial process for the preparation of sucrose esters of fatty acids was described in 1956 by Osipow et al. The process involved a transesterification reaction between sucrose and the methyl ester of a fatty acid in the presence of basic catalyst and mutual solvent, such as dimethylformamide. Sucrose esters are now produced on a semicommercial scale in the United States. The volume of production, however, is far less than had been anticipated because of the cost of solvent lost during processing and the high cost of purifying the sucrose esters to remove traces of solvent and obtain an edible emulsifier. A new process has been developed to avoid the difficulties characteristic of the older process. This new process, which involves the formation of a micro-emulsion instead of the use of a mutual solvent, is described. The following are aspects of the micro-emulsion process. Soap at a pH of above 10 cannot be used to form a micro-emulsion in water without the addition of a fatty alcohol or other amphiphilic molecule. A micro emulsion can form in water at lower pH levels because of the presence of free fatty acids. Alkaline soap alone will form a micro-emulsion in propylene glycol because the soap is ionized to a lesser extent in the nonaqueous solvent. The micro emulsion exists (over)	7.591 EXTRACTION AND SOME PROPERTIES OF ADENOSINE 5'-MONOPHOSPHATE AMINOHYDROLASE FROM PRERIGOR AND POSTRIGOR MUSCLE OF COD Dingle, J. R., and J. A. Hines (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia) Journal of the Fisheries Research Board of Canada <u>24</u>, No. 8, 1717-1730 (August 1967) Jones and Murray (1957) have shown that the concentration of inosine monophosphate (IMP) in cod muscle first increases and then decreases during post-mortem storage of the fish in ice. The IMP is presumably produced from adenosine 5'-monophosphate (AMP) by action of the enzyme 5'-aminohydrolase (EC 3.5.4.6). Because of the importance of IMP, and because of some discrepancies found in studies of the adenosine triphosphatase activity of extracts containing the fibrillar proteins of cod muscle, the authors examined various extracts for the presence of AMP-aminohydrolase and other nucleotide-degrading enzymes. The authors report on some properties of AMP-aminohydrolase found in extracts of both prerigor and post-rigor cod muscle. The 5'-AMP-aminohydrolase activity of prerigor cod muscle could be extracted with either water or 0.02 M succinate buffer with about 90 percent yield; however, 0.02 M KCl gave a low yield. The enzyme tended to be associated with the fibrillar protein fractions in post-rigor muscle. Activity of the unpurified enzyme, as measured by a pH-stat, showed a maximum of pH 7.0 in 0.02 M succinate, and about pH 6.6 in 0.1 M KCl. At pH 7.0, the activities were maximal, and about equal (over)
6.54	TEXTURED PROTEINS Martin, Roy E., and David V. Leclair (Oil Mill Department, Swift and Co., Chicago, Illinois) Food Engineering <u>32</u>, No. 4, 66-69 (April 1967) Soy flours are being textured into high-quality vegetable protein products with a process that produces the bland 52 percent protein products more economically than previously possible. The new technique creates an economical vegetable protein with textural properties comparable to protein fibers spun from soy isolates. The textured soy flour that is not flavored, colored, or sized is sold for 33 cents per pound as it comes from the texturing process. Isolate-spun fibers on a comparable dry basis cost about three times as much. The price of the further processed protein varieties that are flavored, colored, and sized ranges from 45-80 cents per pound. The process can be adjusted to produce these new ingredients in a variety of textures and with many properties. These textured products are available as granules, flakes, dice, and shreds. Unlike purified soy isolates, the soy flours are not spinneret-extruded into protein fibrils and then placed in acid, melted fat, and binder baths. However, fats, flavors, colors, and enrichment materials can be incorporated into the textured soy flour products. The textured flours are being used in some canned products to provide a source of protein enrichment and to improve textural properties. As the processing of soy flour is readily (over)	7.591 (*) COLORIMETRIC DETERMINATION OF ESTERASE AND LIPASE ACTIVITIES EMPLOYING β-NAPHTHOLESTERS Takahashi, Takashi, Tatsuo Morishita, and Shinko Tachino (Fac. Fish. Pref. Univ., Mie, Japan) Bulletin of the Japanese Society of Scientific Fisheries <u>33</u>, No. 6, 560-566 (June 1967) (In Japanese, English summary) Nachlas and Seligman (1949) proposed the colorimetric method in which esters of β-naphthol are used as chromogenic substrates. With this method, they determined the activities of esterase and lipase in serum and urine. Ravin and Seligman (1953) studied the fatty acid esters of β-naphthol in an attempt to find a chromogenic substrate that would distinguish lipase and esterase more precisely. In these studies, the esterolytic activities were measured at alkaline and neutral but not acidic pH. The esterolytic activity of the digestive enzymes of fish should be measured even at acidic pH. Because the procedures reported by Seligman and his coworkers cannot be applied to measures in the acidic ranges, they were modified to permit their direct application to analysis of fish. The substrate is prepared by mixing 50 ml. of buffer solutions, 10 ml. of acetone containing 12 mg. of ester, 2 ml. of 1 percent aerosol solution, and 38 ml. of distilled water. 1 ml. of enzyme solution and 5 ml. of substrate are (over) *Items on back of card.

adjusted and controlled to produce almost any range of physical properties in a textured network, these textured ingredients should find their way into an increasing variety of products such as fish mixes.

Depending upon the foods into which the textured flours are formulated, their physical and functional properties are process altered. The textures are influenced by changes in densities and protein-structural alignments. When dry, the flours are crunchy; when hydrated they are chewy and fibrous. Heat processing does not alter the textural or water absorption properties of the products. Densities are varied in accordance with particle size and degree of porosity. By hydrating the lightest density products with three parts of water, a fishlike texture is obtained. The particle sizes and shapes range from 1 x 1 x 1 in. granules to 3/8-in. cubes and are dried to 1/2-1/1 in. long. The weight of one variety of fully hydrated product is 3-3 1/2 times its original dry weight. The degree of water absorption varies with temperature and particle size to range from over percent water absorption in about 2 min. to 225 percent in over 20 min. Fat absorption is less and ranges from 0.4-1.4 percent over a 10-20 min. period. There is evidence that the structure of these products holds well during freeze drying. Unflavored textured flours have a slightly toasted taste; they will retain natural and synthetic flavors. Finally, the new materials maintain their shape and texture during retorting and storage and go into which they have been incorporated.

only at an elevated temperature; it becomes opaque on cooling, which indicates the transition from a liquid to a solid interfacial film.

Miscibility tests indicated that the propylene glycol solution is the continuous phase in the micro-emulsion. If the solution were the discontinuous phase, it would be easy to understand why the sugar does not precipitate as macro crystals during the distillation.

Of practical importance is the observation that a weight ratio of about 85:15 of sucrose monoester to sucrose diester is obtained with a 1.5:1.0 molar ratio of sucrose to methyl ester in the micro-emulsion reaction. A 3:1 molar ratio of sucrose to methyl ester is required to give the same product in the solution reaction. The presence of the reactants in separate phases, as well as the possibility that the soap forms mixed micelles with the sucrose monoester and acts as a physical barrier to hinder further reactions, may be contributing factors.

The micro-emulsion reaction for the preparation of sucrose esters has a number of advantages over the solvent reaction, such as less excess sucrose is used, the solvent is recovered quantitatively during the reaction, and the solvent is edible and does not form toxic products during the reaction. Residues remaining in the product are not a barrier to its use in food application. The only significant losses that occur are due to the caramelization of the sugar; these losses affect only about 10 percent of the initial sugar content. Recovery of the sucrose ester product in purified form is not complicated.

incubated at 30° C. as follows: 20 min. for acetate, 1 hr. for laurate, and from 3 to 24 hr. for stearate. Following incubation, 5 ml. of 0.44 M trichloroacetic acid solution is added to the reaction mixture and filtered; 2 ml. of the filtrate is pipetted into a test tube and 5 ml. of 0.4 M Na₂HPO₄ solution is added; 1 ml. of chilled solution, to which 4 mg. of tetrazonum has been added, is poured into the mixture; and the mixture is shaken for 1 min. The resulting mixture is shaken with 10 ml. of ethyl acetate for 50 min., after which the red component of the purple azo dye extracted with the solvent is measured at 540 mμ.

Skutumpah, G. M., D. C. Watts, and E. Baldwin (Univ. Coll., London, England)
Chemical Abstracts 64, 16332g (May 23, 1966)

SYNTHESIS OF ACETYL PHOSPHATE BY HOMOGENATES
OF ELASMOBRANCH LIVER

7.591
Starkweather, W. H., H. H. Spencer, E. L. Schwarz, and H. K. Schoch (Univ. of Michigan, Ann Arbor)
Chemical Abstracts 64, 16210d (May 23, 1966)

ELECTROPHORETIC SEPARATION
OF LACTATE DEHYDROGENASE ISOENZYMES
AND THEIR EVALUATION IN CLINICAL MEDICINE

7.591
in 0.1 M KCl, 0.1 M NaCl, and 0.04 M potassium succinate. Under certain conditions, phosphate buffer inhibited the reaction. The enzyme was sensitive to glass and other surfaces; this sensitivity seemed to be the cause of the loss of activity during dialysis. The activation energy was 10.7 kcal. per mole, and the Michaelis-Menten constant (K_m) was 1.1×10^{-3} M.

The results suggested that fish muscle resembles rabbit muscle in the extractability of AMP-aminohydroxylase. It is known that simple extraction of rabbit muscle with water dissolves some myosin; this accounts for the presence of AMP-aminohydroxylase in such extracts. Although the authors confirmed that water does extract more protein prerigor cod muscle than weak salt solutions do, they were unable to prove that the "extra" protein in the water extracts was myosin. The amount of extra protein was only a small fraction of the amount of myosin in the muscle, yet the extract contained most of the aminohydroxylase activity.

The results indicated that the apparent activation by succinate buffer may be due to an increase in ionic concentration, since KCl gave comparable rates. On the other hand, phosphate buffer appeared to inhibit the reaction except at high AMP levels, possibly owing to the competition between the phosphate ion and the phosphate group of the AMP for the active site of the enzyme.

The Michaelis-Menten constant and the pH-dependence of the activity of crude AMP-aminohydroxylase from cod were in partial agreement with those reported for the enzyme prepared from mammalian muscles. The absence of significant adenosine aminohydroxylase activity in extracts of cod muscle is another point of resemblance to mammalian muscle. As Tarr and Comer (1964) did find adenosine aminohydroxylase in ling cod muscle extracts, a survey of various fish muscles for these two aminohydroxylases would be of interest. [27 references]

7.80 EFFECTS OF RADIATION, HEATING AND STORAGE
ON VOLATILE CARBONYL COMPOUNDS IN CLAM MEATS

Gadbois, D. F., J. M. Mendelsohn, and L. J. Ronisvalli (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts)
Journal of Food Science 32, No. 5, 511-515 (September-October 1967)

Introduction.--It is believed that carbonyl compounds contribute to the odors and flavors of food products, so this class of compounds was extensively investigated at the Bureau of Commercial Fisheries' Technological Laboratory at Gloucester. A semiquantitative method for determining carbonyl compounds, as reported by the authors in a previous paper (Gadbois et al., 1965), was used to follow the development of volatile carbonyl compounds. The purpose of the present investigation was to show the effects of irradiation, heating, storage at 33°-35° F., and air and vacuum packing on the development of carbonyl compounds in meat from the soft shell clam (*Mya arenaria*). The authors also hoped to determine the relation between the carbonyl compounds and the quality of the meat.

Method.--A gas-chromatographic method was used to monitor the development of volatile carbonyl compounds. The carbonyl compounds were collected by the high-vacuum, low-temperature distillation method of Merritt et al. (1959). The compounds were identified by comparing their retention times in three different retention columns with those of known compounds. The effects of the different treatments were followed only with a Carbowax 20M column. A number of peaks comprise more than one compound in these scans, and the peaks were effectively separated in either or both of the other columns used. (over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

8.51 STUDIES ON ELASTOIDIN. II - DIALYZABLE PEPTIDES
RELEASED BY PEPsin DIGESTION OF ELASTOIDIN

Kimura, Shigeru, and Minoru Kubota (Tokyo University of Fisheries, Konan, Minatoku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 5, 430-437 (May 1967)

Elastoidin is a highly insoluble collagen complex found in shark fins. Its two main components are a collagen and a noncollagenous protein that is rich in tyrosine. The collagen molecule is insoluble when bound in the elastoidin. The major part of the noncollagenous protein, which accounts for from 20 to 25 percent of the elastoidin fiber, could not be extracted with dilute acetic acid because it is bound to the collagen moiety. However, when elastoidin was solubilized with pepsin, the noncollagenous protein component and the probable terminal regions of the collagen molecule were digested into small peptides that are permeable to a dialyzing membrane.

The high shrinkage temperature, the reversibility of thermal shrinkage, and the insolubility of the elastoidin indicate that it may have cross linkages that other collagens do not have. Amino-acid analysis showed that pepsin-solubilized elastoidin (PSE) resembles typical collagen in both amino-acid composition and molecular structure; it has a high content of tyrosine and an appreciable amount of cystine. However, the analysis failed to prove the presence of any unusual components that could function as cross linkages between the peptide chains. (over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

VOLATILE CARBONYL COMPOUNDS IN CLAM MEATS

DIALYZABLE PEPTIDES FROM SHARK ELASTOIDIN

8.51

AMINO ACID COMPOSITION OF MYOSIN FROM TROUT MUSCLE

Buttkus, H. (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 24, No. 7, 1607-1612 (July 1967)

From 50 to 60 percent of the proteins in the skeletal muscle of fish is made up of myosin. Therefore the nature of the myosin must influence the properties of the muscle appreciably. Since the proteins of trout muscle have been shown to be more thermally stable than those of cod but less stable and less enzymatically active than those of rabbit (Buttkus, 1966), the amino-acid composition of myosin from the white muscle of trout was determined and compared with that of rabbit and cod.

The composition of the myosin of trout was quite similar to that of rabbit; 13 of the amino-acid residues either were identical in concentration or agreed within 3 percent; the histidine and proline concentrations of the two myosins differed most. From these analyses, the apparent molecular weight of the trout myosin was calculated to be 500,027.44 and the apparent specific volume to be 0.735 cm³. This latter value is identical to that yielded by density measurements made on cod myosin by Connell in 1958.

Other findings are tabulated on the reverse side of this card.

[18 references]

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

9.2 STUDIES ON ESTIMATING PARAMETERS OF A FISH POPULATION
(*) SUPPLIED BY SEQUENTIAL RECRUITMENT. I - THE EFFECT
ON ESTIMATES FOR PACIFIC YELLOWFIN TUNA

Ishii, Takeo (Ocean Research Institute, University of Tokyo, Nakano, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 6, 513-523 (June 1967) (In English)

Estimates of such variables as the natural mortality coefficient and the catchability coefficient are required for calculations of fish populations. Several methods of arriving at these estimates have been presented; however, for the application of the methods, it is necessary to assume that recruitment does not occur within the exploited phase of a fish population. Such an assumption leads to error, since the population is not fully exploited at the younger ages and recruitment continues even at ages 3 and 4, the ages at which most of the catch is taken. The author, therefore, evaluated the effect of sequential recruitment on a population-abundance index calculated by methods in which estimates of natural mortality and catchability were estimated in the standard way.

He found that unless the effect of sequential recruitment on the mortality coefficient (M) is taken into account in calculating the population of the younger age groups, the value of M will be underestimated by about 0.2 for 3-year-old fish. Assuming that tuna recruit from ages 1 to 5, he found that an estimated M is impossible to get for ages 1 and 2, that the estimated M for ages 3 and 4 is smaller

*Item on back of card. (over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

AMINO-ACID COMPOSITION OF TROUT MUSCLE MYOSIN

EFFECT OF SEQUENTIAL RECRUITMENT ON ESTIMATES OF TUNA POPULATION

8.51

Analysis of the whole fiber and of each fraction gave the following values:

Substance	Whole fiber		Hexose		Hexosamine		Cystine		Tyrosine		Hydroxyproline	
	Percent	g/100 g.*	Percent	g/100 g.*	Percent	g/100 g.*	Percent	g/100 g.*	Percent	g/100 g.*	Percent	g/100 g.*
Elastoidin	77	0.39	0.56	0.35	0.00	0.18	0.94	7.52	7.93			
Pepsin-solubilized elastoidin	23	0.32	0.32	0.35	0.00	0.18	0.94	7.52	7.93			
Dialyzable peptides												

*Percent of carbohydrate or amino acid in each fraction relative to that in the whole fiber.

The chemical nature of the dialyzable peptides released by pepsin digestion of the elastoidin was studied to show some of the properties of the noncollagenous protein. Although most of the hexose and hexosamine remained with the collagen fraction, small amounts were present in the dialyzable peptides. Paper chromatography revealed that in addition to tyrosine four tyrosine derivatives were present in the hydrolyzate of the dialyzable peptides (3-chlorotyrosine was not one of the four). These results indicate that the peroxide linkages formed by oxidation of two tyrosine residues are not involved in the elastoidin. They do point to the fact that the tyrosine derivatives isolated from the noncollagenous protein are probably related to unusual cross linkages in the elastoidin.

Successive treatments of the native elastoidin with pepsin caused the 8 components that appeared in the denatured state of the pepsin-solubilized elastoidin to be converted into 2 components. This conversion indicates that the cross linkages in the pepsin-solubilized elastoidin may be located in the terminal regions.

7.80

Results.--When air-packed samples of clam meat were irradiated and/or heated, the concentration of carbonyl compounds immediately increased, except for some low-boiling compounds that were reduced in concentration when the samples were heated. Storing the nonirradiated, air-packed samples at 33°-35° F. resulted in a gradual increase in the concentration of volatile carbonyls until about the 20th day of storage, when the trend was reversed.

The effects of irradiation, heating, and storage were minimized when the clam meats were vacuum packed. The pattern of volatile carbonyls in irradiated fresh clams was similar to that found in nonirradiated clams stored at 33°-35° F. for 20 days. The volatile monocarbonyl compounds, C₂ to C₇, and diacetyl that were detected did not appear to have a direct role in the changing quality of stored clam meats.

Conclusions.--The changes that occurred in the volatile carbonyl compounds detected in air- and vacuum-packed cans of clam meats stored at 33°-35° F. do not appear to be directly related to the organoleptic changes. The concentration of the total volatile carbonyl compounds in nonirradiated, air-packed clam meats tends to increase during their storage until spoilage occurs. There is no apparent relation between carbonyl concentration and spoilage after spoilage begins. The authors do not deny the importance of carbonyl compounds nor do they suggest that carbonyl compounds are not objectionable in canned clam meats. They do suggest, however, that the concentration of the compounds detected may be lower than the organoleptic threshold level and therefore are not significant from a quality standpoint.

9.2

than the actual M, and that the estimated M for tuna older than 4 is relatively correct. When he calculated the rate of recruitment from catch data and given values of M and the catchability coefficient, he derived an estimated M for ages 3 and 4 that was different from the given values. Where the rate of recruitment changed, the difference was appreciable.

From these findings, the author concluded that a new method of estimating population parameters must be devised to take sequential recruitment into account.

In this paper, the author deduced a theoretical length composition of fish stocks in a steady state and in a transient period of exploitation, then attempted to determine the mortality coefficient from the length composition.

Kitahara, Takeru (Department of Fisheries, Kyoto University, Maizuru, Japan)

VARIATION OF LENGTH COMPOSITION DUE TO CHANGE IN INTENSITY OF EXPLOITATION TO A STOCK I

8.51

Properties of trout and rabbit myosin

Amino acid	Residues of amino acid from				Recovery by hydrolyzing	
	Trout		Rabbit		trout myosin	
	(conc/10 ⁵ g. protein)	% by wt. [Wi]	(5 x 10 ⁵ g.) (20 C.)	Spec. vol. [Vi]	22 hr. (g. amino acid/100 g. protein)	22-72 hr. (g. amino acid/100 g. protein)
Aspartic acid	86	85	5.29	0.59	9.90	10.24
Asparagine			4.90	0.60		
Threonine	41	36	4.15	0.70	4.15	4.15
Serine	42	45	3.66	0.63	3.66	3.66
Glutamic acid	156	145	14.98	0.66	20.14	20.53
Glutamine			5.30	0.67		
Proline	19	25	1.85	0.76	1.86	1.85
Glycine	43	44	2.51	0.64	2.45	2.51
Alanine	76	71	5.55	0.74	5.40	5.55
Valine	47	44	4.86	0.86	4.66	4.86
Methionine	25	20	3.28	0.75	3.28	3.28
Isoleucine	36	35	4.75	0.90	4.05	4.75
Leucine	77	77	9.17	0.90	8.71	9.17
Tyrosine	19	15	3.26	0.71	3.10	3.26
Phenylalanine	26	23	3.97	0.77	3.83	3.97
Lysine	87	72	11.79	0.82	11.15	11.79
Histidine	12	13	1.78	0.67	1.65	1.78
Arginine	41	38	6.72	0.70	6.40	6.72
Tryptophan	4.0	3.7	0.74	0.74	0.75	0.75
Half-cystine	8.5	7.2	0.89	0.63	0.88	0.88
Σ Wi = 99.40; Σ WVi = 73.05						

0.5 (*) EFFECT OF CHOLINE ON CELL DIVISION OF CLOSTRIDIUM BOTULINUM TYPE E Gullmar, B., and N. Molin (Swedish Institute for Food Preservation Research, Göteborg, Sweden) Journal of Bacteriology 93, No. 5, 1734 (May 1967) A chemically defined medium developed for studies on the nutritional physiology of Clostridium botulinum Type E was found to support good growth, toxin formation, and spore formation. The occurrence of pleomorphic cell forms, chain-forming aggregates, and a prolonged lag phase, however, indicated that the medium was incomplete or unbalanced. A modification of the inorganic salt content and the addition of L-ornithine and L-glutamine improved the growth rate. But swollen, globular forms of cells were still found, and individual cells were still attached to each other to form chains, indicating that the splitting of the transverse cell walls was not complete. Then choline was added in various concentrations to the supplemented basal medium, and chain formation of cells was eliminated. Addition of choline in a concentration of 50 micrograms or more per milliliter resulted in normal cell forms. A table showing composition of the chemically defined medium is given. The medium supports good growth of C. botulinum Type E; the cells are normal and sporulation is better than in any other media tested. The results suggest that choline does have an effect on cell wall synthesis, as indicated by the appearance of rounded cells formed in the absence of choline. Choline also has an effect on the cell-separation system because it prevents the chain formation of cells. *Items on back of card. [Abstracter: M. M. Gwin] COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	2.05 (*) SOME PROPERTIES OF HEAT-RESISTANT AND HEAT-SENSITIVE STRAINS OF CLOSTRIDIUM PERFRINGENS. I - HEAT RESISTANCE AND TOXIGENICITY Weiss, Karl F., and Dorothy H. Strong (Department of Foods and Nutrition, University of Wisconsin, Madison) Journal of Bacteriology 93, No. 1, 21-26 (January 1967) Four strains of Clostridium perfringens were examined for sporulating ratios; toxigenicity for mice; heat resistance at 100° C. (D-values); and lecithinase activity, which was expressed as micrograms per milliliter of enzyme as determined by the lecithovitelin reaction. A definite inverse relation was found between thermal resistance and toxigenicity. The D-values ranged from 17.6 for the most heat-resistant strain of C. perfringens to 0.3 for the least heat-resistant strain; corresponding lecithinase activities ranged from 20 to 133 µg. per ml. of enzyme, respectively. Sporulating ratios did not differ greatly among the strains. The heat stability of toxin from C. perfringens was greater at 100° C. than at 75° C. A noticeable difference occurred between the heat stabilities of toxin in the culture fluids of heat-sensitive and heat-resistant strains at pH 7.0 when the toxic filtrates were held at 100° C. A similar, but lesser difference was seen at pH 5.5 with a holding temperature of 75° C. There was no change in heat resistance and lecithinase activity when a substrain of the least heat-resistant parent strain was obtained through heat selection by a single transfer, or when the most heat-resistant strain was serially transferred 12 times. [24 references] [Abstracter: M. M. Gwin] *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
1.85 (*) TWO PROMISING SHRIMP AREAS DISCOVERED Anonymous Western Fisheries 75, No. 1, 40 (October 1967) Scientists of the Fisheries Research Board of Canada have completed a survey of potential shrimp grounds in southern Hecate Strait, in Queen Charlotte Sound, and off the east coast of Vancouver Island. The most promising area was off Pearl Rocks in Queen Charlotte Sound. There, working at depths of from 70 to 105 fathoms, they averaged 300 pounds of mixed shrimp per catch; 95 percent of the catch was smooth pink shrimp of a size that averaged 134 to the pound. The second most promising area was off Kains Island near the entrance to Quatsino Sound. Although the area is small, it has produced good results during several seasons in the past two decades. In 1967, for example, the catches there averaged 335 pounds, with 87 percent smooth pink at 77 shrimp to the pound and the rest side-striped at 32 shrimp to the pound. *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	2.3 (*) DEVICE FEEDS HERRING INTO FILLET MACHINE Anonymous Western Fisheries 75, No. 1, 44 (October 1967) A Swedish machinery firm has marketed a new device for automatically feeding herring into a gutting and filleting machine. The machine, which feeds herring onto a conveyor belt with all the heads pointed in the same direction, has a capacity of from 161 to 280 fish a minute, depending on the size of the herring. One person can operate both the feeding machine and the gutting-filleting machine. [Abstracter: L. Baldwin] *Items on back of card.
0.5 (*) EFFECT OF CHOLINE ON CELL DIVISION OF CLOSTRIDIUM BOTULINUM TYPE E Gullmar, B., and N. Molin (Swedish Institute for Food Preservation Research, Göteborg, Sweden) Journal of Bacteriology 93, No. 5, 1734 (May 1967) A chemically defined medium developed for studies on the nutritional physiology of Clostridium botulinum Type E was found to support good growth, toxin formation, and spore formation. The occurrence of pleomorphic cell forms, chain-forming aggregates, and a prolonged lag phase, however, indicated that the medium was incomplete or unbalanced. A modification of the inorganic salt content and the addition of L-ornithine and L-glutamine improved the growth rate. But swollen, globular forms of cells were still found, and individual cells were still attached to each other to form chains, indicating that the splitting of the transverse cell walls was not complete. Then choline was added in various concentrations to the supplemented basal medium, and chain formation of cells was eliminated. Addition of choline in a concentration of 50 micrograms or more per milliliter resulted in normal cell forms. A table showing composition of the chemically defined medium is given. The medium supports good growth of C. botulinum Type E; the cells are normal and sporulation is better than in any other media tested. The results suggest that choline does have an effect on cell wall synthesis, as indicated by the appearance of rounded cells formed in the absence of choline. Choline also has an effect on the cell-separation system because it prevents the chain formation of cells. *Items on back of card. [Abstracter: M. M. Gwin] COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	2.3 PATHOGENS HANDLING FRESH FISH

6.34 (*) Anonymous Western Fisheries <u>74</u>, No. 3, 55-56 (June 1967) A firm recently formed in Vancouver, British Columbia, intends to harvest kelp from beds around the Queen Charlotte Islands. The firm has signed an "intent of contract" with a North Vancouver shipyard for a 156-foot aluminum harvesting vessel. The harvester is expected to cost \$750,000 and will qualify for a federal subsidy of 30 or 50 percent. Algin will be the major extract from the kelp. Algin is used as a stabilizer and thickener in over 100 products, such as toothpaste, ice cream, tires, and paint. The residue left after the algin is extracted from the kelp "flower" is rich in potash and other soil nutrients. This residue will be bagged and sold as fertilizer, or sold in bulk to be added to other fertilizers. The firm expects to begin operations in the summer of 1968 and anticipates a harvest of 100,000 tons of kelp, which will yield about 4,000,000 pounds of algin and algin derivatives. Canadian industry used about this amount of algin in 1963 and paid an average purchase price of \$1.50 per pound for it. [Abstracter: E. R. Weissman] *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 23 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	7.80 (*) Theimer, Ernst T. (International Flavors and Fragrances, Union Beach, New Jersey), and John T. Davies (University of Birmingham, Department of Chemical Engineering, Birmingham, England) Journal of Agricultural and Food Chemistry <u>15</u>, No. 1, 6-14 (January-February 1967) The "penetration and puncturing" theory of olfaction quantitatively explains the olfactory threshold of different types of molecules. According to this theory, odor type depends on rates of desorption and molecular cross-sectional areas. However, the quality of an odor is more difficult to measure and to interpret in fundamental terms. The penetration and puncturing theory was tested as it applied to musk odor. More than 50 compounds were used, including groups possessing strong musk odor and groups with weak or no musk odor. The study confirmed the correlation between musk odor intensity, and desorption rate and molecular dimensions. It also showed that chemical type is not important. The muskiness as evaluated by a test panel corresponded to the evaluations predicted by the theory. Good musks had standard desorption rates in the 0.4 to 1.7 range, molecular cross sections of 40 to 57 square Angstrom, and ratios of 2.8 to 3.3 of length to breadth of molecule. [28 references] [Abstracter: M. M. Gwin] *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 23 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
7.51 (*) Cole, C. V., and Cleon Ross (Colorado State University, Fort Collins) Analytical Biochemistry <u>17</u>, No. 3, 526-539 (December 1966) This paper describes procedures that were developed for the study of the early products of phosphorus incorporation by plant roots. The procedures were designed to (a) stop all enzymic activity at the instant of killing, (b) protect the products from chemical degradation, and (c) allow quantitative separation of soluble and nonsoluble compounds. These procedures were also found useful in studies of nucleotide and ribonucleic acid synthesis in kidney bean and cocklebur leaves using either P32- or Cl4-labeled precursors. The authors feel the procedures may have wide application to a variety of plant tissues. [18 references] [Abstracter: M. F. Triple] *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 23 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	9.19 (*) Lue-Hing, C. Diss. Abstr. B. 1966, 27, (1966) Journal of the Science of Food and Agriculture <u>18</u>, No. 8, 11-69 (August 1967) The sensitivity of serum enzymes and serum albumin to organic pesticides provides a system for detecting trace pesticide pollution. Cholinesterase, glutamic oxalacetic transaminase, and glutamic pyruvic transaminase of goldfish (<i>Carassius auratus</i>) and trout (<i>Salmo gairdneri</i> Richardson) respond to trace amounts of pesticides in water. Also, the ratio of serum albumin to globulin varies as the amounts of pesticide vary. [Abstracter: L. Baldwin] *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 23 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
7.51 (*) Christov, D., Z. Rashev, and Sp. Khadzhrusev Chemical Abstracts <u>66</u>, No. 17, 72466s (April 24, 1967) COMPARATIVE ELECTROPHORETIC STUDIES OF THE SARCOPLASMIC PROTEINS IN VERTEBRATES *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 23 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	9.19 (*) Mallet, Lucien Chemical Abstracts <u>67</u>, No. 6, 25240z (August 7, 1967) MARINE POLLUTION OF POLYCONDENSED HYDROCARBONS OF THE 3,4-BENZOPYRENE TYPE AT THE NORTH AND WEST COAST OF FRANCE AND THEIR INCIDENCE IN BIOLOGICAL MEDIA, ESPECIALLY IN PLANKTON COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 23 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

O'Sullivan, A. J. (Lancashire and Western Sea Fisheries, 16 Walton's Parade, Preston, Lancashire, England), and Alison J. Richardson (Lawn Hill, 57 Markfield Road, Groby, Leicester, England)
Nature 214, No. 5087, 448 541-542 (April 29, 1967)

On March 18, 1967, the tanker Torrey Canyon ran aground off a southern promontory of the Cornish coast. Efforts to refloat the ship included releasing some 60,000 tons of crude oil into the sea. Each day thereafter some 22,500 gallons of detergent was used in efforts to emulsify the oil. This report describes the results of these measures in terms of their effect on the marine life in the affected area.

The mixture of emulsified oil and detergent proved to be far more damaging to the intertidal marine life than the oil alone was, first because detergents are normally toxic in themselves, and second because, once the oil is emulsified, it becomes part of the aqueous environment and is breathed in or ingested by marine organisms. The authors strongly recommend that all aspects of such oil pollution problems--those involving fisheries, marine plant life and sea birds, as well as the amenity value of the beaches--be studied so that an effective solution will be available should another such incident occur.
[Abstracter: L. Baldwin]

Kiyoura, Katsaku (Tokyo Inst. Technol., Tokyo, Japan)
Chemical Abstracts 67, No. 10, 46996r (September 4, 1967)

INDUSTRIAL WASTE WATER AND PUBLIC HAZARDS.
COUNTERMEASURES FOR WASTE WATER FROM PETROLEUM COMPLEXES

9.19

AN APPARATUS FOR THE ISOLATION OF VOLATILE COMPOUNDS
FROM FOODS

08.7

Herz, Karl O., and Stephen S. Chang (Department of Food Science, Rutgers--The State University, New Brunswick, New Jersey 08903)
Journal of Food Science 31, No. 9, 937-940 (November-December 1966)

The features and performance of an apparatus that can isolate volatile compounds, which may contribute flavor to a wide variety of foods, are described. The apparatus uses the principle of flash evaporation and vaporization from a continuous thin, heated film. Liquid foods, such as fruit juices, need no preparation; foods such as meat are first made into a fine water slurry. Food constituents that are vaporized are recovered by condensation in a series of specially designed cold traps.
[Abstracter: M. M. Owin]

Jones, N. R. (Torrey Res. Station, Aberdeen, Scotland)
Chemical Abstracts 64, 14871a (May 9, 1966)

HYPOXANTHINE AND OTHER PURINE-CONTAINING FRACTIONS
IN FISH MUSCLE AS INDEXES OF FRESHNESS

7.80

Byerly, T. C. (Cooperative State Research Service, U.S. Department of Agriculture, Washington, D.C.)
Science 157, No. 3791, 890-895 (August 25, 1967)

Under optimum conditions, young healthy individuals of livestock species may convert about one-third of the digestible protein in feed into tissue protein in the body; humans use about half of this tissue protein as food. Lactating mammals and laying hens genetically selected for high production and fed a diet ad libitum may convert as much as 50 and 30 percent, respectively, of ingested digestible feed protein into food protein.

Beef cattle, sheep, and wild ruminants convert the roughage supplied by plants and plant materials to food protein; these plants and plant materials are not eaten by man. Increasing use of nonprotein nitrogen compounds as a substitute for feed protein for cattle and sheep can release increasing quantities of feed protein for human food without curtailing the meat and milk supply. Substantial improvement in efficiency of feed conversion can be accomplished if additional research is applied to the problem.
[39 references]
[Abstracter: M. F. Triple]

Luboshnikov, A. G., and A. P. Prostoyakov (Vses. Yashchurny Nauch.-Issled. Inst., Vladimir, U.S.S.R.)
Chemical Abstracts 67, No. 13, 61478e (September 25, 1967)

RAPID DETERMINATION OF PROTEIN AFTER ITS FRACTIONATION
BY AMMONIUM SULFATE

7.51

LEG NITROGEN STRENGTH MOOLBE HIGH

46.9

(961, 01 october) 967821, 55 abstracts 906, 92, 3 U.S. Patent

CRYSTALLIZATION OF SUGAR IN ALGINATE GELS

46.9

Kasahara, Fumio, Mitsugu Kobayashi, and Tamae Hamano (Kimitsu Chem. Ind. Co., Tokyo, Japan)
Chemical Abstracts 65, 15660a (November 7, 1966)

Teapko, A.
Chemical Abstracts 65, 17594h (November 21, 1966)

NEW RAW MATERIAL FOR THE PRODUCTION OF SODIUM ALGINATE

6.34

Salz, Fernando
Chemical Abstracts 65, 18976e (December 5, 1966)

ESTIMATION OF ALGINIC ACID

6.34

Konagaya, Tuneso
Bulletin of the Japanese Society of Scientific Fisheries 32, 507-510 (June 1966)

A model purse seine was analyzed for the influence of the velocity on the seine during the pursing operation.

The results are summarized as follows: (1) When the pursing operation is rapid, the corks of the bunt section are pulled into the water at the final stage of the pursing operation. In two cases, the corks did not sink and the net maintained its normal form. (2) The tension of the purseline during the pursing operation is illustrated. The relations between the pursing velocity (v) and the tension (T) of the purseline are expressed as $T = av$. [Abstracter: M. F. Tripple]

[Abstracter: L. Baldwin]

Because of the large number of grilse killed by salmon purse seiners during the past season in the San Juan area, Director Rod Hourston, of the Canadian Department of Fisheries, has proposed a minimum bunt mesh size of 4 inches. This 4-inch increase would be effective in Area 20 during the 1968 season.

Anonymous
Western Fisheries 75, No. 1, 43 (October 1967)

SEINE MESH SIZE INCREASE SUGGESTED

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 25
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

RADIATION PASTEURIZATION OF TROPICAL FISH - BOMBAY DUCK (HARPODON NEHEREUS)

Sawant, P. L., S. S. Mavinkurve, S. Saroja, K. A. Savagaon, and U. S. Kumta (Biochemistry and Food Technology Division, Bhabha Atomic Research Center, Bombay, India)
Food Technology 21, No. 3A, 126A-130A (March 30, 1967)

This study was to determine the technological merits of radiation processing over conventional preservation methods for extending the fresh storage life of eviscerated Bombay duck (*Harpodon nehereus*). At 10°-12° C., the unirradiated fish deteriorated within 3 days. Radiation pasteurization at 0.25, 0.5, and 1 Mrad extended the storage life for 14, 21, and 46 days.

Analyses of the storage properties of irradiated and unirradiated fish are presented. These analyses are based on the sensitivity of spoilage bacteria to radiation and heat, the nature of structural proteins, and the losses by drip. The relations between bacterial load, organoleptic score, and chemical indices are discussed in terms of radiation-induced changes in spoilage flora.

The authors found that high bacterial counts in irradiated fillets, unlike those in unirradiated samples, are not indicative of spoilage. The content of total volatile basic nitrogen served as a better indicator of incipient spoilage than did either bacterial load or tyrosine equivalent in the irradiated fillets. Organoleptic attributes are governed by the level of the radiation dose. [34 references]

[Abstracter: M. M. Gwin]

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Sano, Yoshihiko
Journal of the Japan Oil Chemists' Society 15, No. 9, 456-460 (1966)

A major component of the multibranched-chain fatty acids in fin whale blubber oil and in blue whale bone oil was identified as 3,7,11,15-tetramethylhexadecanoic acid. Identification was by means of high resolution nuclear magnetic resonance, infrared and mass spectrometry, and gas-liquid chromatography. The acid was also a minor component of the blubber oils of sei whale and sperm whale. The acid was synthesized from phytol and compared with the naturally occurring multibranched-chain fatty acids. [20 references.]

[Abstracter: M. F. Tripple]

Rzhekhin, V. P., and N. I. Pogonkina
Chemical Abstracts 67, No. 6, 23106m (August 7, 1967)

DETERMINATION OF FATTY ACIDS IN WHALE FAT BY DISTRIBUTIVE CHROMATOGRAPHY

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 3 PAGE 25
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

FATTY ACID OXIDATION IN RELATION TO CHOLESTEROL BIOSYNTHESIS IN RATS

Dupont, Jacqueline (Biochemistry Department, Howard University College of Medicine, Washington, D.C.)
Lipids 1, No. 6, 415-421 (November 1966)

The factors that result in increased cholesterol synthesis are the same factors that are involved in rapid fatty acid oxidation. This experiment was designed to determine whether the rate of oxidation of dietary lipid and the rate of synthesis of cholesterol vary in proportion to each other in rats. Groups of male and female rats were fed diets containing, on a calorie basis, 2 percent corn oil (low-fat diet), 42 percent corn oil (high-corn-oil diet), or 2 percent corn oil plus 40 percent beef tallow (high-beef-tallow diet). After 2 weeks on these diets, rats of each sex and diet group were given an intraperitoneal injection of either ¹⁴C-acetate, -stearate, -oleate, or linoleate. The incorporation of acetate into cholesterol and the rate of oxidation of each fatty acid were determined. The specific activity of cholesterol was higher in female rats than in males, higher for the high-beef-tallow diet with 40 percent lipid than for the low-fat diet, and higher for the high-corn-oil diet than for the beef-tallow diet. Linoleate was oxidized more rapidly than was oleate, which was oxidized more rapidly than was stearate. Fatty acid oxidation rate, percent of each fatty acid in the diet, and percent of lipid calories in the diet were used to compute an index of dietary lipid oxidation. It was found that serum cholesterol-¹⁴C was proportional to the dietary lipid oxidation index. [38 references] [Abstracter: M. M. Gwin]

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

FREE FATTY ACID FORMATION IN COD LIVERS
STERILIZED BY IRRADIATION

Ackman, R. G., J. E. Stewart, and H. E. Power
Journal of the Fisheries Research Board of Canada 23, 155-156 (January 1966)

(Abstract of this article appears under 3.15 page 7 - December 1966)

CHANGES OF FISH FAT DURING CURING.
I - FORMATION OF AMINO ACID-LIPID COMPLEXES

Bal, V. V., and S. R. Dominova (Tech. Inst. Fish Ind. and Econ., Astrakhan, U.S.S.R.)
Chemical Abstracts 64, 14869a (May 9, 1966)

[Abstracter: M. N. Gwin]

This article discusses the significance and basic causes of fat oxidation in production of food; the relation between fat oxidation and oxygen pressure; and the procedures that use low oxygen pressures in packaging and storage of food.
[22 references]

INFLUENCE OF OXYGEN PRESSURE ON FAT OXIDATION

Marcuse, R.
Rivista. Ital. Sostanze Grasse 43, 302-309 (1966) (Milan, Italy)
Journal of the Science of Food and Agriculture 18, No. 3, 1-115 (March 1967)

COMMERCIAL FISHERIES ABSTRACTS VOL. 12 NO. 3 PAGE 47
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

THE USE OF ANTIOXIDANTS FOR PROTECTING
SALTED ANCHOVY FROM OXIDATION

Kristofersen, G. S.

Ryb. Khoz. 41, No. 3, 66-67 (1965) (In Russian)
Abstracts from Current Scientific and Technical Literature 18, Abstract No. 1342, P. 256 (June 1965)

Experiments carried out indicated that butylated hydroxytoluene increased the stability of anchovy fat to oxidation 1.4 times and propyl gallate, 1.7 times. Organoleptic tests confirmed that propyl gallate preserved the quality of the anchovy to a greater extent than did butylated hydroxytoluene.

ANTIOXIDANT EFFECT OF ERYTHORBIC ACID
(D-ARABOSCORBIC ACID) ON FATS AND OILS

Olcott, Harold S. (Univ. of California, Berkeley)
Chemical Abstracts 64, 14871g (May 9, 1966)

THE SYNERGISTIC EFFECTS OF ALIPHATIC AMINES
WITH PHENOLIC-TYPE ANTIOXIDANTS

COMMERCIAL FISHERIES ABSTRACTS VOL. 12 NO. 3 PAGE 47
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SPOILAGE
RANCIDITY

ANTIOXIDANTS

PRODUCTION OF FISH OIL

ICHTHYOLOGY

TREATMENT OF WASTE WATER OF THE FISH INDUSTRY

Netherlands Appl. 6,514,062
Chemical Abstracts 65, 10324b (September 26, 1966)

PRODUCTION OF SALT- AND ACID-RESISTANT EMULSION OILS

Pozharliev, G., E. Popov, and V. Konstantinov
Chemical Abstracts 66, No. 8, 30236m (February 20, 1967)

WHALE-OIL PROCESSING

Khorin, T. A. (Zhirkovoi Komb., Tselisk, U.S.S.R.)
Chemical Abstracts 66, No. 25, 114718h (June 19, 1967)

NEUTRALIZATION OF LOW-GRADE TECHNICAL FISH OILS

Aleksandrovskii, V. P., V. I. Shenderzyuk, S. Yu. Yunusova, and G. A. Darmograi
Chemical Abstracts 66, No. 8, 30238p (February 20, 1967)

COMMERCIAL FISHERIES ABSTRACTS VOL. 12 NO. 3 PAGE 27
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ON THE HORIZONTAL MOVEMENT OF SALMON

AS INDICATED BY THE SURFACE GILLNET CATCHES.

I - DIRECTION OF MOVEMENT OF SALMON OFF THE WEST COAST
OF THE KAMCHATKA PENINSULA

Saito, Shoji, and Shigekatsu Nakane (The Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 7, 641-650 (July 1967)

The horizontal movement of salmon, particularly the direction and the distance of the movement during a given night, is important to the gill netter. To determine the extent of this movement, the authors strung two nets in L-shaped sets off the west coast of the Kamchatka Peninsula. The sets were changed to various directions and distances during the five-set experiments. The shape and direction of the nets were kept under observation by means of echo images that were transmitted from corner reflectors mounted on the nets. The number of fish gilled and the side of the net from which the fish entered the net were determined as each net was hauled in.

Results showed that the catch ratio was highest for both pink and chum salmon on the south side of the nets. The relation between the catch ratio and the direction in which the nets were laid led the authors to assume that the direction of movement of the salmon in the area sampled is predominantly northward. Because of the notable difference that the direction of net life made in catch ratio, they concluded that the salmon move in a relatively straight line during any one night.
[Abstracter: L. Baldwin]

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